

Big Data Text Summarization

Using Deep Learning to Summarize Theses and Dissertations

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https://github.com/xw0078/CS5984Fall_Team16/

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Abstract

Team 16 in the fall 2018 course “CS 4984/5984 Big Data Text Summarization,” in partnership with the University Libraries and the Digital Library Research Laboratory, prepared a corpus of electronic theses and dissertations (ETDs) for students to study natural language processing with the power of state-of-the-art deep learning technology. The ETD corpus is made up of 13,071 doctoral dissertations and 17,890 master theses downloaded from the University Libraries’ VTechWorks system. This particular study is designed to explore big data summarization for ETDs, which is a relatively under-explored area. The result of the project will help to address the difficulty of information extraction from ETD documents, the potential of transfer learning on automatic summarization of ETD chapters, and the quality of state-of-the-art deep learning summarization technologies when applied to the ETD corpus.

The goal of this project is to generate chapter level abstractive summaries for an ETD collection through deep learning. Major challenges of the project include accurately extracting well-formatted chapter text from PDF files, and the lack of labeled data for supervised deep learning models. For PDF processing, we compare two state of the art scholarly PDF data extraction tools, Grobid and Science Parse, which generate structured documents from which we can further extract metadata and chapter level text. For the second challenge, we perform transfer learning by training supervised learning models on a labeled dataset of Wikipedia articles related to the ETD collection. Our experimental models include Sequence-to-Sequence and Pointer Generator summarization models. Besides supervised models, we also experiment with an unsupervised reinforcement model, Fast Abstractive Summarization-RL.

The general pipeline for our experiments consists of the following steps: PDF data processing and chapter extraction, collecting a training data set of Wikipedia articles, manually creating human generated gold standard summaries for testing and validation, building deep learning models for chapter summarization, evaluating and tuning the models based on results, and then iteratively refining the whole process.

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Chapter 1

Introduction

1.1 Overview

On January 1, 1997, Virginia Tech became the first university to require graduate students to submit their theses and dissertations (ETDs) electronically [2]. The University Libraries is currently digitizing thousands of pre-1997 ETDs and loading them into VTechWorks, the Virginia Tech institutional repository, which now holds over 30,000 ETDs. Much of the graduate level research output is recorded in ETDs, and the collection has come to represent a rich and important body of graduate research and scholarship.

ETDs are generally made up of multiple sections and chapters. It is often the case that some of these chapters would be useful as stand-alone entities. This project aims to automatically construct English language summaries of each of the chapters in an ETD. To do so would advance the identification, discovery, and potential for reuse of these important document components.

1.2 VTechWorks ETD Dataset

The Virginia Tech University Libraries' ETD collection consists of over 30,000 open access documents: 13,071 doctoral dissertations and 17,890 master theses¹. It covers myriad disciplines across all of Virginia Tech's academic departments. The collection of ETDs is housed in VTechWorks, the Virginia Tech institutional repository, and maintained by the University Libraries. Each item representing a single ETD in the repository is made up

¹Last counted November 2018

of several files. Among these are usually a PDF of the main thesis document, a full-text version extracted from the PDF using optical character recognition (OCR), metadata files, and oftentimes various and sundry supplementary files.

The first part of our project involves attempts to identify and extract chapters from ETDs. We found the OCR text files to be not very useful. Most were an unstructured mix of section headings, chapter text, table and figure captions, running headers, page numbering, and so on, all jumbled together. We concluded that the only way to accurately identify and parse the text from individual chapters was to extract them directly from the PDF documents. Our process for extracting chapters from the PDFs is described in Chapter 3.

1.3 Problem definition

This project addresses problems related to summarizing long documents by answering the following research questions.

RQ1: *Can we identify and extract individual chapters from an ETD document?*

RQ2: *Can we automatically construct summaries of chapters from an ETD through existing deep learning models with non-local training data?*

RQ3: *Can we improve the quality of automatically constructed summaries for the same model through partial-local training data?*

RQ4: *Can we improve the quality of automatically constructed summaries for the same model through combining partial-local and non-local training data?*

Chapter 2

Literature Review

2.1 PDF Processing

2.1.1 Overview

One of our major challenge in this project is to extract desired information from PDF files. PDF format is widely used in publications and can be generated from various sources. The unstructured data nature of PDF makes it hard to parse and transform to structured content. Our first task for the project is to find an optimal solution to get chapter level text from our ETD collection. We look into tools including PDFBox, Grobid, and Science Parse.

2.1.2 PDFBox

The Apache PDFBox¹ library is an open source tool for creating, manipulating, and extracting content from PDF documents. The project has roots in information retrieval. It was originally developed for extracting text from PDFs to be indexed in Lucene [1].

2.1.3 Grobid

GROBID stands for GeneRation Of Bibliographic Data. It is a machine learning library for extracting, parsing and re-structuring raw documents such as PDF into structured TEI-encoded documents with a particular focus on technical and scientific publications.

¹<https://pdfbox.apache.org/>

First developments started in 2008 as a hobby. In 2011 the tool has been made available in open source. Work on Grobid has been steady as a side project since the beginning and is expected to continue until at least 2020. [5] [23]

The main functionality of Grobid combines bibliographical data extraction and multi-level term extraction from scientific publications in PDF format. Grobid applies Conditional Random Fields (CRF) to automatic extraction of bibliographical data, following the approach of [33], which is implemented with the Mallet toolkit [24]. Grobid applies the same concept to document segmentation, which is the main focus in our project here.

Benchmark for Full Text Structures

Tables 2.1 and 2.2 report the benchmark for full text structures.

Table 2.1: Grobid Strict Matching (exact matches)

label	accuracy	precision	recall	F1
figure_title	96.55	27.97	22.77	25.1
reference_citation	57.18	55.93	52.97	54.41
reference_figure	94.57	60.92	61.09	61
reference_table	99.09	82.83	82.42	82.62
section_title	94.46	74.7	66.82	70.54
table_title	97.46	8.01	8.27	8.14
all fields	89.88	58.1	54.84	56.42 (micro average)
	89.88	51.73	49.06	50.3 (macro average)

Table 2.2: Grobid Soft Matching (ignoring punctuation, case, and space characters mismatches)

label	accuracy	precision	recall	f1
figure_title	98.42	74.49	60.64	66.85
reference_citation	59.53	60.02	56.84	58.39
reference_figure	94.52	61.9	62.07	61.98
reference_table	99.08	83.35	82.94	83.14
section_title	95.09	79.05	70.71	74.65
table_title	97.59	15.79	16.31	16.04
all fields	90.7	63.14	59.6	61.32 (micro average)
	90.7	62.43	58.25	60.18 (macro average)

2.1.4 Science Parse

Science Parse parses scientific papers (in PDF form) and returns them in structured form. As of today, it supports these fields:

- Title
- Authors
- Abstract
- Sections
- Bibliography
 - Title
 - Authors
 - Venue
 - Year
- Mentions, i.e., places in the paper where bibliography entries are mentioned

This project is a hybrid between Java and Scala. The interaction between the languages is fairly seamless, and SP can be used as a library in any JVM-based language [8]. Similar to Grobid, Science Parse also uses Conditional Random Fields bibliographical data extraction. When compared with similar contemporary tools, Science Parse significantly performs better in the extraction of many fields [46].

2.2 Doc2Vec

The vector space model for information retrieval [40] introduced the concept of representing words as vectors. Recent work in learning vector representations of words using neural networks led to Mikolov et al. [26] developing the popular word2vec tool, which takes a text corpus as input and produces word vectors as output. Building on the idea of word vectors, Le and Mikolov [21] proposed the *Paragraph Vector*, which learns fixed-length vector representations from variable-length pieces of texts, such as sentences, paragraphs, and documents. The Gensim [37] Python library for topic modeling introduced the popular doc2vec, an implementation of Paragraph Vector for Python. Gensim's doc2vec also supports inferring document embeddings from new, unseen documents. Using doc2vec, the similarity of two documents can be calculated by using a pre-trained model to infer a vector for each of the two documents and measuring the cosine distance between them.

2.3 Abstractive Text Summarization through Deep Learning

2.3.1 Overview

Text summarization methods can be broadly classified into two types: *Extractive* and *Abstractive*. Extractive summarization tends to use the existing sentence structures without using any out-of-vocabulary words. This results in a few important sentences ending up in the summary. On the other hand, Abstractive summarization focuses more on capturing the gist of the input text by condensing the important parts from all relevant sentences. In this process, the summary has completely new sentence structures and sometimes has out-of-vocabulary words too. The summary generated this way also needs to be

coherent, comprehensible and readable. Since doing abstractive summarization involves more intelligence, it is usually a more difficult task for machines to accomplish.

We started with exploring various techniques for text summarization, for which “A Survey on Automatic Text Summarization” [20] was really helpful. Extractive summarization relies solely on the extraction of sentences and emphasizes what the summary content should be. Abstractive summarization demands advanced language generation techniques and aims to produce a grammatical summary. We started exploring various techniques to find if a sentence is worthy to be extracted for summarization. The paper “TextRank: Bringing Order Into Texts” [25] was a great resource. We then shifted our attention to various Text Abstraction techniques as exhibited in the subsequent sections.

2.3.2 Seq2Seq Model

While exploring potential deep learning models that can be used to perform summarization, we came across a few papers that made use of sequence to sequence models. As described by the paper ‘Abstractive Text Summarization using Sequence-to-sequence RNNs and Beyond’ [30], sequence to sequence models have been used in the past to perform tasks such as Machine Translation and speech recognition. As identified by Bahdanau et al. in the paper ‘Neural machine translation by jointly learning to align and translate’ [10], an Attentional Recurrent Neural Network (RNN) encoder-decoder model is well suited for the task of machine translation. Summarization can be described as the mapping of an input sequence of words (from the source document) to a target sequence of words (the generated summary).

The architecture of this model is inspired by the model described in the paper ‘Neural machine translation by jointly learning to align and translate’ [10]. A basic sequence-to-sequence model consists of an encoder and a decoder. The encoder takes in the input text and then produces a feature representation of this input data. The encoder that has been used is a bidirectional Gated Recurrent Unit-Recurrent Neural Network (GRU-RNN). This RNN encoder may take the input as a sequence of words and then produce a fixed-length vector that corresponds to the input text. The input that has been encoded by the encoder is then used by the decoder to generate new data - a summary of the input text, in this case. The decoder used here is a unidirectional GRU-RNN. The hidden-state size of the encoder and decoder is the same and an attention mechanism has been used over the source hidden states. In addition to this, a soft-max layer has been added over the target

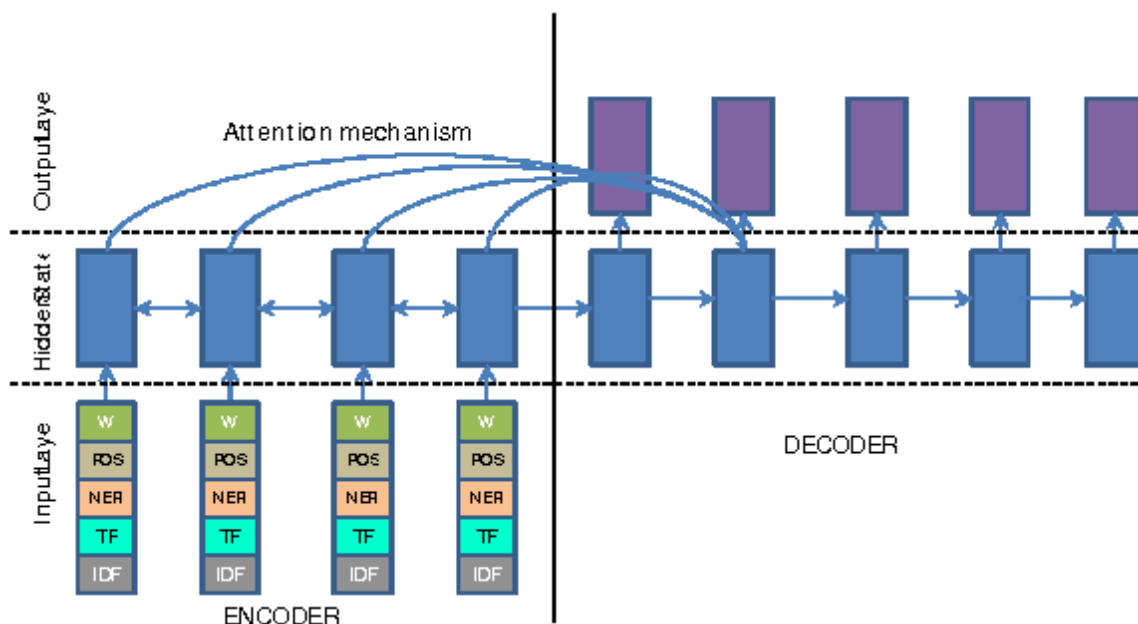


Figure 2.1: Architecture of sequence-to-sequence model [30]

vocabulary to generate words. The activation function used is the Rectified Linear Units (ReLU) and the loss function used is weighted cross-entropy loss.

2.3.3 Pointer-Generator Model

Overview

Pointer-Generator network [41], published in ACL 2017, is a successor to the "sequence to sequence with attention mechanism" abstractive summarization model as we mentioned in the previous section. In this model, it aims to solve the problems of seq2seq; summaries sometimes reproduce factual details inaccurately, and the summaries sometimes repeat themselves. Figure 2.2 shows the architecture of seq2seq with attention model.

The author gave the following two examples for these two problems:

- Problem 1: Germany beat Argentina 3.2
- Problem 2: Germany beat Germany beat Germany beat.

For the first problem, a Pointer-Generator network uses a pointer to copy words from the input text, which means the network will learn that sometimes it is good to copy the

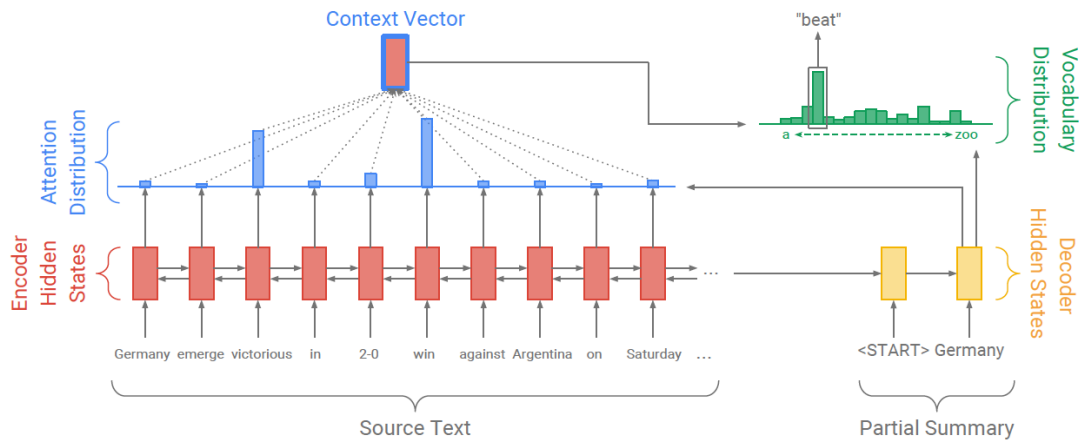


Figure 2.2: Architecture of sequence-to-sequence model with attention mechanism [41]

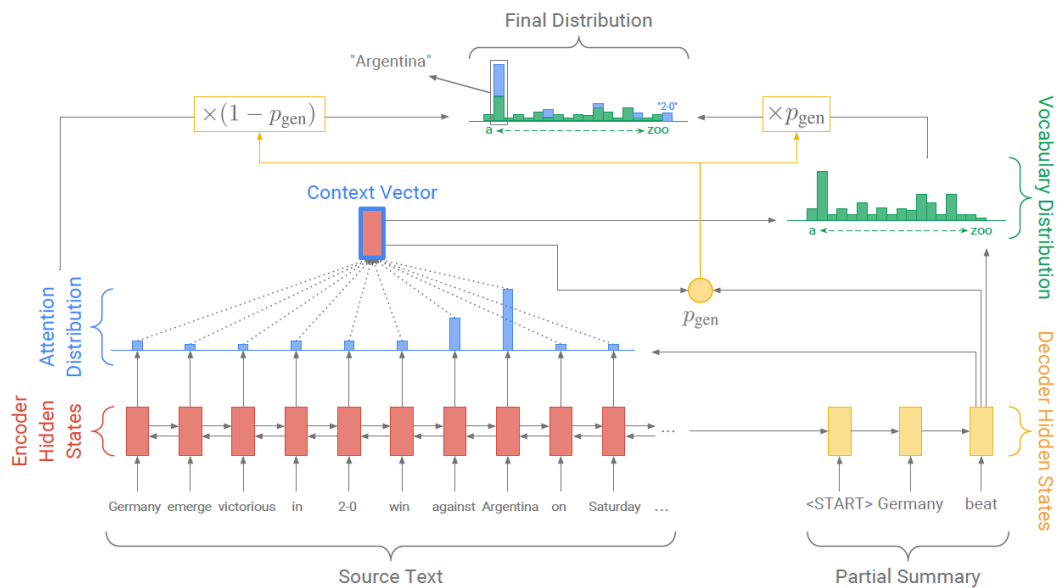


Figure 2.3: Architecture of pointer generator network [41]

original context from the input. In detail, the encoded context vector of the network

includes both the vocabulary distribution (which word to generate) and attention distribution (which word to point to and copy). The final distribution will decide the output.

As to the second problem, the network penalizes repeatedly attending to same parts of the source text. In detail, the network use cumulative attention (coverage) as extra input to the attention mechanism, and then penalizes attending to things that have already been covered.

Figure 2.3 shows the architecture of a pointer generator network.

Limitations

The generated summaries from the pointer-generator network are still mostly extractive.

2.3.4 Fast Abstractive Summarization-RL

We explored the technique demonstrated in the paper “Fast Abstractive Summarization with Reinforce-Selected Sentence Rewriting” [14]. The research tries to mimic the patterns of humans summarizing long documents, i.e., first compressing the text, followed by paraphrasing it. Most of the previous works on text summarization has been evaluated on the CNN-Dailymail dataset. The research claims to achieve the state-of-the-art on all metrics (including human evaluation) on the CNN-DailyMail dataset, as well as significantly higher abstraction scores. By combining the advantages of extractive and abstractive paradigms, the proposed hybrid extractive-abstractive architecture, with policy-based reinforcement learning (RL) to bridge together the two networks, seems to be a very promising framework for our task. The intermediate extractive behavior proves to be helpful to improve the overall model’s quality, speed, and stability. Another feature of the model is that it can avoid almost all redundancy issues as the model has already chosen non-redundant salient sentences and then it abstractively summarizes the text. Apart from its better accuracy relative to the previous models, this parallel decoding model results in a significant 10-20x speed-up vs. other models.

The overall model consists of two submodules: the extractor agent and the abstractor network. A hierarchical neural model is used to learn the sentence representations of the document and a ‘selection network’ is used to extract sentences based on their representations. A temporal convolutional model has been used to compute the representation of each individual sentence in the documents. To further incorporate the global context of the document and capture the long-range semantic dependency between sentences,

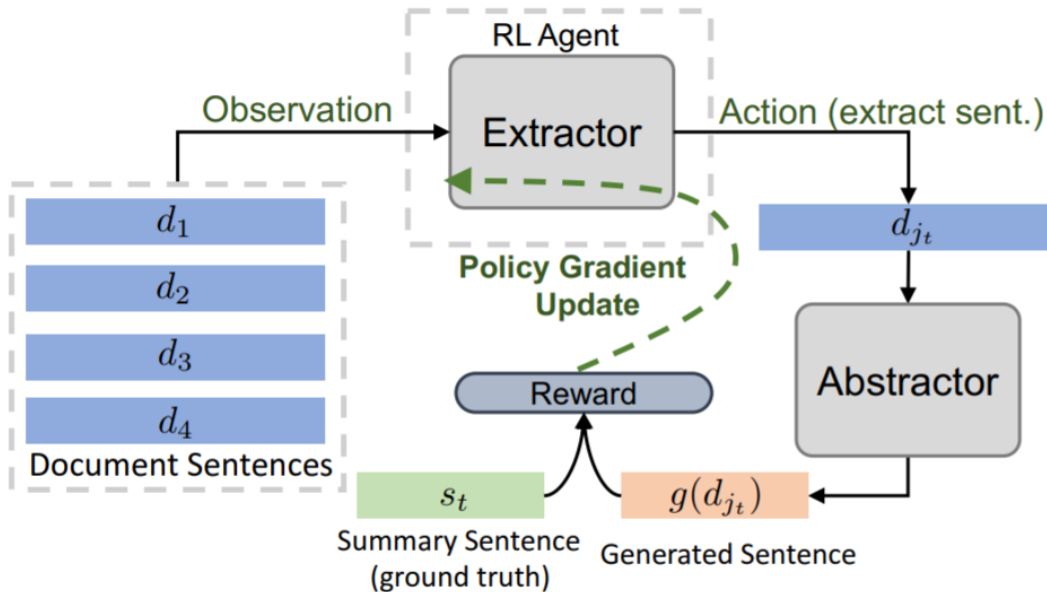


Figure 2.4: Reinforced training of the extractor and its interaction with the abstractor [14]

a bidirectional LSTM-RNN has been incorporated. Another LSTM-RNN has been added to train a Pointer Network to select the extracted sentences based on the sentence representations. For the abstractor network a standard encoder-aligner-decoder has been used. The copy mechanism has been added to help directly copy some out-of-vocabulary words. The abstractor always rewrites the sentence selected by the extractor. If the extractor chose a good sentence, the ROUGE match with the ground truth post the abstractor step would have a higher numeric value and thus the action is encouraged. If a bad sentence is chosen, though the abstractor still produces a compressed version of it, the summary would not match the ground truth, so the low ROUGE score discourages this action. [14]

2.3.5 Other Models

Reinforced Learning-Sequence to Sequence Model

The framework of Seq2Seq comprises of an encoder and a decoder and can produce competitive results, but can be further improved. An attention-based model over the in-

put, pointer-generation models, and self-attention models have been proposed in recent times, which can produce results having better metrics over previous models. However, even these seq2seq models have shortcomings. They suffer from two common problems: 1) exposure bias [36] and 2) inconsistency between train/test measurement. RL-Seq2Seq is an effort in the same direction, addressing these two problems, combining the power of RL methods in decision-making with sequence-to-sequence models that enable remembering long-term memories.

So in order to avoid the exposure bias problem, the author suggested to remove the ground-truth dependency during training and use only the model distribution to minimize cross-entropy (CE) loss using a scheduled sampling method [11]. First pre-train the model using cross-entropy loss and then subsequently replace the ground-truth with a sampled action from the model. The second problem is that model training is done using the cross-entropy (CE) and is evaluated during the test time using discrete and non-differentiable measures, BLEU and ROUGE. This creates a mismatch between the training objective and the test objective and therefore yields inconsistent results. Both exposure bias and non-differentiability of evaluation measures can be addressed using reinforcement learning. The idea is to pre-train the model for a few epochs using the cross-entropy loss and then slowly switch to the REINFORCE loss. Figure 2.5 represents the architecture of the model. [32]

This model is implemented by Yaser et al. [19] and presented in their paper. Link to their Github code repository. [48].

Keras Text Summarization Models

Keras [3] is a high-level neural networks API, written in Python and capable of running on top of TensorFlow, CNTK, or Theano. It was developed with a focus on enabling fast experimentation. Being able to go from idea to result with the least possible delay is key to doing good research. The important salient features of this API are user friendliness, modularity, ease of extensibility, and the ability to work with Python. Because of these features, Keras is often considered easier to work with as compared to TensorFlow for prototyping use-cases. [29]

Keras text summarization [13] is a Github repository where multiple implementations of relevant abstractive text summarization models have been implemented. The two main types of models available in this repository are Seq2Seq and Recurrent Neural Networks (RNNs) [30]. The implementation in this repository is mainly done using the methods

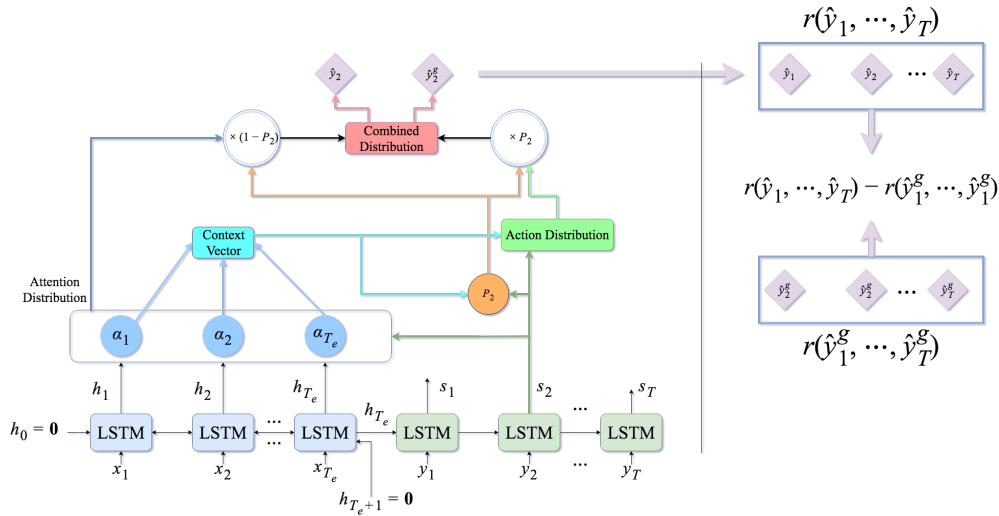


Figure 2.5: Self-critic policy-gradient model for Abstractive Text Summarizing [32]

proposed in [30] and [39]. The tutorial followed for implementing the models in this repository is available at [12].

The following seq2seq models are available in this repository:

- Seq2Seq summarization with one-hot encoding.
- Seq2Seq summarization with GloVe word embedding.
- One-shot Recurrent Neural Networks.
- Recursive Recurrent Neural Networks.

2.4 ROUGE Evaluation

ROUGE is an evaluation method for text summarization where ROUGE stands for Recall-Oriented Understudy for Gisting Evaluation. It includes measures to automatically determine the quality of a summary by comparing it to other (ideal) summaries created by humans [22]. ROUGE has been widely used as the performance score for abstractive summarizations. All of the models we mentioned in previous sections use ROUGE to

evaluate their performance. In our project, we will also apply ROUGE evaluation against our trained model. There are four different ROUGE measures: ROUGE-N (where N=1, 2, etc.), ROUGE-L, ROUGE-W, and ROUGE-S. ROUGE-1, ROUGE-2, and ROUGE-L are commonly used to evaluate abstractive summarization models.

ROUGE-N

An n-gram recall between a candidate summary and a set of reference summaries [22]. For example: ROUGE-1 calculates the overlap of each word (1-gram) between the system and reference summaries; ROUGE-2 calculates bigrams instead. A candidate summary that contains words shared by more references, similarity on n-gram, would get higher ROUGE-N score.

ROUGE-L

Statistics on longest common sub-sequence (LCS). LCS is the problem of a finding longest sub-sequence which is common to all sequences in a set of sequences, two sentences for example. One advantage of using LCS is that it does not require consecutive matches but in-sequence matches that reflect sentence level word order as n-grams. The other advantage is that it automatically includes longest in-sequence common n-grams, therefore no predefined n-gram length is necessary. However, LCS suffers one disadvantage that it only counts the main in-sequence words; therefore, other alternative LCSes and shorter sequences are not reflected in the final score [22].

Figure 2.6 shows an example of ROUGE evaluation from a pointer generator paper[42].

2.4.1 Limitation

ROUGE score tends to rewarding extractive content. Summaries can be rephrased in various ways, ROUGE can not reflect the quality of such summaries that are different from their references.

	ROUGE		
	1	2	L
abstractive model (Nallapati et al., 2016)*	35.46	13.30	32.65
seq-to-seq + attn baseline (150k vocab)	30.49	11.17	28.08
seq-to-seq + attn baseline (50k vocab)	31.33	11.81	28.83
pointer-generator	36.44	15.66	33.42
pointer-generator + coverage	39.53	17.28	36.38
lead-3 baseline (ours)	40.34	17.70	36.57
lead-3 baseline (Nallapati et al., 2017)*	39.2	15.7	35.5
extractive model (Nallapati et al., 2017)*	39.6	16.2	35.3

Figure 2.6: Models and baselines in the top half are abstractive, while those in the bottom half are extractive. Those marked with * were trained and evaluated on the anonymized dataset, and so are not strictly comparable to our results on the original text. All of our ROUGE scores have a 95% confidence interval of at most ± 0.25 as reported by the official ROUGE script. [41]

Chapter 3

Approach, Design, Implementation

3.1 Experiment Design

This project addresses problems related to summarizing long documents by answering the following research questions.

RQ1: *Can we identify and extract individual chapters from an ETD document?*

RQ2: *Can we automatically construct summaries of chapters from an ETD through existing deep learning models with non-local training data?*

RQ3: *Can we improve the quality of automatically constructed summaries for the same model through partial-local training data?*

RQ4: *Can we improve the quality of automatically constructed summaries for the same model through combining partial-local and non-local training data?*

ETDs are generally made up of multiple chapters and sections, but the structure of these documents varies widely, especially across different disciplines. Nearly every ETD in our collection is encoded in Portable Document Format (PDF). The structure of a PDF document is communicated to human readers through typesetting conventions (e.g., chapter openers will usually display the chapter number). But unlike markup languages

like HTML and XML, the internal structure of a PDF document is not explicitly delimited, making it difficult for chapters and sections to be parsed and extracted. For this project, we investigate tools like Grobid and Science Parse, which use machine learning techniques to try to determine the structure of PDF documents and represent them as structured XML or JSON. Their ability to do so determines our success in answering *RQ1*.

To answer *RQ2* we tested three deep learning methods for abstractive text summarization: Sequence-to-Sequence, Pointer-Generator, and Fast Abstractive Summarization-RL. All three perform well on the CNN-DailyMail dataset, but we found no evidence that they have been used to summarize ETDs. These models require a large set of training data in order to produce good results. To our knowledge, no set of labelled data for ETD chapters and summaries exists. To overcome this limitation, we perform transfer learning on our models by training them with Wikipedia data. Our implementation process is described in detail below.

3.2 Implementation

3.2.1 Chapter Level Text Extraction from ETD

In determining the structure of ETD documents in PDF, we found the most success with Grobid [5], which extracts information from PDF documents and structures it into TEI (Text Encoding Initiative) documents. Originally published in 1994, the TEI Guidelines for Electronic Text Encoding and Interchange [43] (see also the current TEI Guidelines [4]) define an XML format with a comprehensive range of tags for describing the semantic structure of a document. Listing 1 demonstrates the overall structure of a typical TEI document. Listing 2 shows the body structure of a TEI document and how chapters are encoded.

With the ETD documents encoded in TEI, we extract chapters using the following XPath expression.

```
/tei:TEI/tei:text/tei:body/tei:div[tei:head]
```

Note, the XPath expression above does not target `<div>` elements with the attribute `@type="chapter"`. The Grobid generated TEI does not make use of the `@type` attribute, making chapter extraction a bit more challenging.

```

<TEI xmlns="http://www.tei-c.org/ns/1.0">
  <teiHeader>
    <!-- ... -->
  </teiHeader>
  <text>
    <front>
      <!-- front matter of copy text, if any, goes here -->
    </front>
    <body>
      <!-- body of copy text goes here -->
    </body>
    <back>
      <!-- back matter of copy text, if any, goes here -->
    </back>
  </text>
</TEI>

```

Listing 1: Overall structure of a typical TEI document [4]

3.2.2 Parse Wikipedia Dump

We aim to extract abstract and article text for each page from the English Wikipedia dump where the abstract will serve as our training labels and article content as training input. For parsing the Wikipedia dump, the Gensim library [37] provides a nice parser that produces a cleaned text output for each Wikipedia entry in JSON format¹. Please find section 5.1.2 on how we use the Gensim parser.

The output JSON file contains the following entries:

- 'title' - title of article
- 'section_titles' - list of titles of sections
- 'section_texts' - list of content from sections

¹https://radimrehurek.com/gensim/scripts/segment_wiki.html

```

<body>
  <div type="part" n="1">
    <div type="chapter" n="1">
      <head><!-- heading of part 1, chapter 1 --></head>
      <!-- text of part 1, chapter 1 -->
    </div>
    <div type="chapter" n="2">
      <!-- text of part 1, chapter 2 -->
    </div>
  </div>
  <div type="part" n="2">
    <div n="1" type="chapter">
      <!-- text of part 2, chapter 1 -->
    </div>
    <div n="2" type="chapter">
      <!-- text of part 2, chapter 2 -->
    </div>
  </div>
</body>

```

Listing 2: TEI document body structure with chapters [4]

Next, we want to extract and flatten the JSON file into our desired format:

- ‘title’ - title of article
- ‘abstract’ - abstract of the article
- ‘textbody’ - text body of the article including section titles

3.2.3 Select Wikipedia Articles Related to the ETD Collection

Successful results with deep learning depend on a large set of training data. Our design methodology is to train our models on articles from Wikipedia, since a large set of labelled data for ETD chapters and summaries is not available, and to generate labelled pairs

manually would be prohibitively expensive. Most Wikipedia articles are structured such that the lead section contains a summary of the rest of the article. Our intuition is that the article lead/article body pairs from Wikipedia could be used for transfer learning in the absence of chapter summary/chapter text pairs for ETDs. Also, the range of topics covered by the online encyclopedia resembles that of our ETD collection, which covers thousands of disciplines across all of Virginia Tech’s academic departments. However, the Wikipedia corpus is actually too big and its coverage is too vast. We needed to select a smaller subset of Wikipedia articles that best represents our ETD collection.

Table 3.1: doc2vec hyper-parameter values used for generating Wikipedia models.

Method	Vector Size	Window Size	Min Count	Epoch
PV-DBOW	200	8	10	10

To determine which Wikipedia articles to include in our training corpus, we decided to turn them into document vectors [21] so that we could determine the cosine similarity between Wikipedia articles and ETD chapters. We used Gensim Doc2vec to learn document embeddings for the entire corpus of the English Wikipedia, which we obtained from the Wikimedia download site². Our hyper-parameter settings are detailed in Table 3.1. We used the resulting doc2vec model to infer vectors for each ETD chapter in our collection, and queried the models to find similar articles from Wikipedia. Any article with a cosine similarity to an ETD chapter of 0.5 or greater were included in our training corpus. After we get the list of Wikipedia titles that are related to our ETD collection, we filter out this subset from our cleaned JSON file. This process results in two collections: one collection that is related to ETD theses and one to all our ETD collection (dissertations and theses). The corresponding result data sizes are 312 Mb and 1 Gb. Note that this process could take a long time depends on the hardware. We did the experiment on a single Linux system with two Intel(R) Xeon(R) CPU E5 and the process took approximately one day.

²Wikimedia Downloads: <https://dumps.wikimedia.org/>

3.2.4 Training Data Generation

Besides that the content is similar to our ETD collection, we need to make sure the input text length and label length would be similar to our ETD collection as well. Wikipedia articles have various lengths on both abstract and article content. The variety of lengths on the input text and label will have negative impact on training. In this case, we further filter out Wikipedia records in which the abstract length is shorter than 100 characters and text body is shorter than 1000 characters. We also remove the abstract and references sections from the text body. It is important not to have an abstract section in our training input, which will cause the label data (abstract) being included in the training data. What's more, the references section is not helpful since the summary of the content will not benefit much from this context. On the other hand, we do not include the references part from our ETD collection when generating the summaries.

The final stage to prepare training data is to convert our JSON file to the desired format for all deep learning models. All of our models require the same input format as the CNN-DailyMail collection. We prepared a script for transforming our JSON input to the required format³. Our script is mainly derived from the code provided by CNN-DailyMail Github repository⁴ with one major change. The original script uses hard coded rules for sentence segmentation since CNN-DailyMail collection is well written with no much variance on text format. However, the text in Wikipedia contains much more unpredictable content. Thus, we applied the NLTK sentence tokenizer⁵ to extract sentences from the text body.

3.2.5 Train Deep Learning Models

For our training collection, we now have the CNN-DailyMail collection and our ETD related Wikipedia collection. The main part of the project is to discover the possibility of transfer learning on summarization models to apply to our ETD collection. We made the following hypotheses: the model trained on our Wikipedia collection will produce a better summary when compared to the model trained on the CNN-DailyMail dataset; the model trained on both CNN-DailyMail collection and Wikipedia collection will have better performance than the model trained on a single collection; the model trained on

³https://github.com/xw0078/CS5984Fall_Team16/blob/master/pipeline/WikiJson_to_PGM_Bin.ipynb

⁴<https://github.com/abisee/cnn-dailymail>

⁵<https://www.nltk.org/api/nltk.tokenize.html>

both CNN-DailyMail collection and Wikipedia collection will have an influence on the final evaluation of the CNN-DailyMail test dataset.

We design the following training experiments for each model:

- CNN-DailyMail
- All Wikipedia
- CNN-DailyMail+thesis related Wikipedia
- CNN-DailyMail+All Wikipedia

After we get all the trained model, we will evaluate each of them and examine our hypotheses. We will also find out which model is producing the best result among our three candidates.

3.2.6 Seq2Seq Model

This model was originally trained on the CNN-DailyMail dataset [18]. Since the pre-trained model has not been made public, we had to train the model.

Table 3.2: Hyper-parameter values used for training on CNN-DailyMail dataset.

Max tokens of generated summary	Max source text tokens	Batch size	Vocabulary size	Number of iterations
100	400	64	40000	22K

Table 3.3: Hyper-parameter values used for training on Wikipedia dataset.

Max tokens of generated summary	Max source text tokens	Batch size	Vocabulary size	Number of iterations
500	500	64	40000	5134

As illustrated in Table 3.2, since the length of the abstracts of the news articles were approximately 100 words long, the number of tokens of the generated summary was set to 100 for training on this dataset. The wall time required to train this model on Cascades was 100 hours. The article lengths for the news articles were approximately 400 words long which is why we set the max source text tokens to 400 tokens. The model makes use of a vocabulary file which includes words along with their frequency values (based on the dataset on which it is being trained).

As illustrated in Table 3.3, the batch size and vocabulary size was the same as the values used to train the model on the CNN-DailyMail dataset. Since the Wikipedia articles were comparatively longer, we made use of documents with length of abstracts between 100-500 for training. The model was trained on articles that had a minimum body length of 1000 tokens.

3.2.7 Pointer-Generator Model

We use the PyTorch implementation of Pointer-Generator model called Pointer-Summarizer. Please refer to section 5.5 about the usage of Pointer-Summarizer.

We have the following 3 different hyper-parameter settings for our experiments:

Table 3.4: Hyper-parameters for pointer-generator network training: E1, E2, and E3 are three different settings for our experiments; Max Gen means for the Max tokens of generated summary; Max Source means for Max source text tokens; Coverage means whether coverage is used or not; Batch Size means number of batches each iteration of the network takes.

	Max Gen	Max Source	Coverage	Batch Size	Vocab Size	NO. iterations
E1	100	400	No	2	50K	50K
E2	500	1000	Yes	2	20K	50K
E3	500	1000	Yes	4	100K	50K

Models are trained on the Cascades GPU cluster with one Nvidia V100 GPU for each training experiment. In Table3.4, for E1, we use the default setting from the Pointer-Summarizer except that batch size is reduced from 8 to 2 since our Wikipedia input has much longer sequences, and the memory of the GPU will not be able to hold big batch

size in the GPU memory; for E2, we increase the number of input tokens and generated tokens and we reduce vocab size to 20K for the same GPU memory concern as E1, we also apply coverage option for better results; for E3, we keep the same setting as E2 except that we increase the vocab to 100K where we dealt with the memory issue through isolating the computation of word embedding layer on the CPU side to decrease the total GPU memory demand for the network.

The approximate training time for E1 and E2 is 2 - 3 days; E3 takes longer, up to 5 - 6 days.

3.2.8 Fast Abstractive Summarization-RL

The project⁶ provides two versions of pretrained models based on the CNN-Dailymail dataset⁷, both of which can be downloaded from the links provided. While the *acl* model can be used to reproduce the results of the paper[14], the *new* model is based on a newer version of the PyTorch library to produce better results. We ourselves trained the model with the various dataset combinations.

Table 3.5: Configuration used for training the abstractor and extractor models

Vocabulary Size	Word Embedding Dimensions	Training Batch size	Gradient Clipping
50000	300	32	2.0

Table 3.5 shows the configuration used to train the abstractor and extractor models on the above dataset combinations. The maximum number of words in a single article sentence was limited to 100 and maximum number of words in a single abstract sentence was limited to 30.

For the RL training, the abstractor and extractor checkpoints with the best learning rates were chosen. Table 3.6 shows the hyper-parameters while training the model.

⁶https://github.com/ChenRocks/fast_abs_rl

⁷<https://github.com/ChenRocks/cnn-dailymail>

Table 3.6: Configuration used for training the RL model

Reward Function	Learning Rate Decay Ratio	Discount Factor	Gradient Clipping	Training Batch Size
rouge-l	0.5	0.95	2.0	8

3.2.9 Other Models

Reinforced Learning-Sequence to Sequence Model

The model's ⁸ implementation provides three versions to choose from, and among those we used Policy-Gradient w. Self-Critic learning. It is implemented using TensorFlow, required Python 2.7, CUDA 9, and Cudnn 7.1 as environment parameters. It is designed and based on the CNN-DailyMail dataset ⁹ for which the helper code and process to follow to generate the data set is provided in the link. We trained the model on:

1. CNN-DilyMail Dataset
2. Large Wikipedia data dump (articles similar to theses and dissertations).

Table 3.7 shows the configuration used:

Table 3.7: Configuration used for training

Intradecoder	Temporal attention	Pretraining w. MLE	Batch size	Train size
false	false	true	32	287226

Before RL training we had to pre-train the model for 15 epochs, that is 134,637 iterations. After that, RL training can commence, and will continue for 14 epochs, that is 260,298 iterations in continuation, and in the end there is the coverage step for 3 epochs. These number of iterations and epochs are recommended by the author of the code.

⁸<https://github.com/yaserkl/RLSeq2Seq>

⁹<https://github.com/yaserkl/RLSeq2Seq/tree/master/src/helper>

As we progressed ahead in training of the model on the CNN-DailyMail data, we saw that after RL training, the output for the input articles was containing a lot of unknowns, and structure was also missing. We were able to see that loss did reduce but it remained higher than the value it was supposed to have. So in order to improve the output we tried to change the hyper-parameters that we used to train the model, like vocab limit, no. of epochs (no. of iterations). Output did marginally improve in terms of article keywords in the output, but the structure was still absent. Since the model required a good amount of time to train, and there was a limit to how much we could experiment, and with availability of better models, we decided not to further pursue this model.

Keras Text Summarization

The repository provides multiple models to choose from. Out of these models, we worked on the Seq2Seq Glove summarizer model and the Recursive RNN 2 model. This model was designed to train on a simple CSV file containing two columns, viz. article and abstract. A sample dataset and the training weights were provided in this repository. We also trained this on the CNN-DailyMail dataset by converting the bin files to the required CSV format. The Seq2Seq Glove summarizer model was trained for about 100 epochs while the RNN model was trained for about 300 epochs.

The outputs of both of these models were not ideal. They had a lot of repetitions and frequently had unknowns. Further, for a few instances, new unrelated words were introduced in the generated summary. As a result, due to time constraints and possibility to implement better models, we decided to look for other models.

Chapter 4

Evaluation

We evaluate our models with standard ROUGE metrics and human assessment. We use the recall score for ROUGE-1, ROUGE-2, and ROUGE-L. The results are obtained from the pythonrouge package¹.

4.1 Data Preprocessing Evaluation

4.1.1 Grobid and Science Parse on PDF extraction

Both Grobid and Science Parse accept PDF files and parse the text of these PDF files. While Grobid generates the output as an XML file, Science Parse generates a JSON file. We performed a comparison on the generated outputs of both Grobid and Science Parse by randomly selecting a few theses and dissertations from different disciplines such as Architecture, English, and Computer Science.

In case of ETDs from disciplines such as Architecture and English, both Grobid and Science Parse tend to skip chapters or merge two chapters. However, in most cases, Grobid is able to extract chapters better than Science Parse. Both Grobid and Science Parse tend to append the page number along with the text body. Additional data such as institute name, date of publication, and keywords are extracted by Grobid, whereas Science Parse does not include these values. Science Parse includes a special 'referenceMentions' section to indicate the places in the paper where a bibliography

¹<https://github.com/tagucci/pythonrouge/tree/master/pythonrouge/RELEASE-1.5.5>

Table 4.1: Human assessment of Grobid and Science Parse outputs

	Grobid	Science Parse
Output File Format	XML	JSON
Table of Contents	Adds table of contents and list of figures at the end	Maintains order of table of contents and list of figures
Abstract	Occasionally misses the abstract	Often detects the abstract correctly
Chapters	Occasionally skips chapters especially in case of ETDs of disciplines such as Architecture where there are a large number of images present along with the text	Often skips chapters and merges some chapters together
Figures	Adds a <code><ref type="figure"></code> tag to indicate the existence of a figure	Does not indicate the existence of a figure, often appends the figure title as part of the text
Tables	Adds a <code><ref type="table"></code> tag to indicate the existence of a figure	Does not indicate the existence of a table
References	Parses the reference string into author - first and last name, publication - issue, published, volume	Parses the reference string into title, author, venue, year. Does not further split these values. Skips some references while extracting.

entry is present. As indicated in Table 4.1, in most scenarios, Grobid tends to perform better than Science Parse.

4.2 Model Evaluation

We take human evaluation and ROUGE performance to evaluate our auto-generated summaries for different experiments. Through human evaluation, we find out that our experiments with combining different training resources are making dramatic differences.

You can find all the predicted results for our golden standards in Appendix A.

4.2.1 Seq2Seq Model

ROUGE Performance

The average ROUGE scores obtained after evaluating our results against the golden standards are given in Table 4.2. As observed from the ROUGE scores, the model performed the best when it was trained on the original CNN-DailyMail dataset. The scores for the model after it was trained on a combination of Wikipedia (documents similar to theses) and CNN-DailyMail were worse than the others.

Table 4.2: ROUGE Performance: Seq2Seq model

	Rouge		
	1	2	L
CNN-DailyMail	0.20417	0.06918	0.16152
WikiAll	0.06272	0.0115	0.05816
CNN-DailyMail+WikiTh	0.01029	0.00342	0.01029
CNN-DailyMail+WikiAll	0.07748	0.0181	0.06899

Observations

An example of the results obtained from the model is illustrated in Table 4.3. This includes the results obtained after training on all the different datasets.

Table 4.3: A representative example of the results obtained from the Seq2Seq model

DARKO, C. B. <i>Effects of Storage Conditions of Aspergillus Growth and Aflatoxin Production in Peanuts. A Study in Ghana.</i> Thesis, Virginia Tech, Feb. 2017. http://hdl.handle.net/10919/75020
Chapter 2
Gold standard summary: Peanuts, which are a leguminous crop, are rich in calories and vital nutrients, vitamins, antioxidants, minerals. They have many health benefits. Being a staple food in Ghana, they are highly important for the region. Cancer-causing aflatoxins are secondary metabolites of some aspergillus fungi. Regulations on aflatoxins have been established, to protect humans and animals from their harmful effects. Aflatoxin-producing fungi need favorable temperature, relative humidity and grain moisture conditions to grow and produce toxins. Aflatoxin production can occur in the field prior to harvest also. Both pre and post-harvest aflatoxin contamination may cause losses of Grains. Post harvest peanut activities are conducive for aflatoxin development. Since storage is an important factor to combat the contamination, various storage solutions have been developed. Some of the storage solutions can pose challenges under Ghanaian conditions Chemical and bio-control can leave residues on peanuts during and after storage. Getting carbon dioxide, nitrogen, and other inert gases to displace oxygen under modified and controlled atmosphere can also be challenging. However, it can meet the goal of finding an appropriate, affordable, and adaptable storage system to help reduce or control aspergillus growth, aflatoxin production, and maintain the quality of peanuts. In addition, packages friendlier to the Ghanaian environment are hermetic storage and active packaging. The type of packaging used for storage can also reduce the rate of lipid oxidation and quality deterioration.
Seq2Seq: CNN_DailyMail: <UNK> Peanuts are rich in calories and contain many nutrients , vitamins , antioxidants and minerals . <UNK> <UNK> They contain high amounts of fats and proteins and can be used in curbing protein energy malnutrition -LRB- Eshun . <UNK> <UNK> They contain high amounts of fats and proteins and can be used in curbing protein energy . <UNK> None
Seq2Seq: WikiAll: <UNK> is a production of the country of the country of the country of the country of Ghana .</s>
Seq2Seq: CNN_DailyMail+WikiThesis: <UNK> <UNK> <UNK> is a <UNK> <UNK> .

Seq2Seq: CNN_DailyMail+WikiAll: <UNK> is a production of the production of three separate in the country of Ghana .</s>

The main issues with the output of this model include:

- A common issue with sequence to sequence models is the presence of <UNK> tokens. This occurs when the test data contains vocabulary that is different from the original vocabulary that was used to train the model. This model, however, tries to deal with this issue by making use of a switch and alternating between a pointer generator mechanism. As we can observe from the results in Table 4.3, the <UNK> tokens still appear at the beginning and end of the sentences (in case of the CNN-DailyMail result).
- Another common issue that sequence to sequence models have is repetition. In case of the CNN-DailyMail dataset, this repetition is relatively low. However, as observed from the CNN-DailyMail+WikiAll example, multiple tokens have been repeated.

Conclusion

Answers for our research questions as to sequence-to-sequence model:

- RQ2: Summaries can be automatically generated with limited information that is related to our target.
- RQ3: Comparing to the answer of RQ2, the Wikipedia collection confused the model and caused a large number of <UNK> tokens to be generated.
- RQ4: The model did not perform well when the two resources were combined.

4.2.2 Pointer-Generator Model

ROUGE Performance

The averaged ROUGE score on our golden standards for Pointer-Generator models are given in Tables 4.4&4.5&4.5. The model trained on the original CNN-DailyMail collection

achieves the best ROUGE score. Comparing with the model trained on CNN-DailyMail, the performance of the model is decreasing overall by combining more Wikipedia training resources. In this case, we don't find the proof for our hypothesis that the Wikipedia training resources will help to improve the model performance. It is also indicating that the combination of these two distinct training resources is confusing the model to produce correct results. On hyper parameter changes, E2 generally produces longer summaries and less repeating content comparing to E1, which is considered to be a better solution.

Table 4.4: ROUGE Performance: Pointer-Generator E1

E1	Rouge		
	1	2	L
CNN-DailyMail	0.23783	0.09704	0.21277
WikiAll	0.17199	0.0562	0.15392
CNN-DailyMail+WikiTh	0.19376	0.07587	0.17449
CNN-DailyMail+WikiAll	0.11133	0.0336	0.10251

Table 4.5: ROUGE Performance: Pointer-Generator E2

E2	Rouge		
	1	2	L
CNN-DailyMail	0.22982	0.07827	0.2068
WikiAll	0.17153	0.05731	0.15523
CNN-DailyMail+WikiTh	0.21424	0.07804	0.18966
CNN-DailyMail+WikiAll	0.13725	0.04079	0.1219

Human Evaluation

Through our human assessment, we have following observations:

Models trained on individual source:

- Though E2 and E1 have similar ROUGE score, E2 generally produces better summaries than E1, considering the output length and language structure.

Table 4.6: ROUGE Performance: Pointer-Generator E3. Still in training, waiting for results

E3	Rouge		
	1	2	L
CNN-DailyMail	NA	NA	NA
WikiAll	NA	NA	NA
CNN-DailyMail+WikiTh	NA	NA	NA
CNN-DailyMail+WikiAll	NA	NA	NA

- Model trained on CNN-DailyMail only tends to give information about describing an object.
- Model trained on WikiAll only tends to have a similar style as in a Wikipedia introduction by giving definition to an object.

Models trained on combined source:

- E2 produces much better summaries than E1 in most cases.
- Models trained on CNN-DailyMail+WikiTh usually produce the longest summary among all models with more information. However, the language structure is usually worse than results from models trained on individual source.
- Models trained on CNN-DailyMail+WikiAll usually fail with many unknown tokens.

Table 4.7: A representative sample

NACIRI, W. M. Bug Finding Methods for Multithreaded Student Programming Projects. Thesis, Virginia Tech, Aug. 2017. http://hdl.handle.net/10919/78675
Chapter 7
Gold standard summary: An analysis tool was developed to make multithreaded programming easier for students. Although the tool gave successful results in the user study, there is some room for improvement. When detecting a deadlock, the tool only identifies the line number where the threads deadlock. Willgrind could track which locks are held to indicate the exact acquisition that caused the deadlock. WillgrindPlus could be enhanced to detect atomic variables for different memory consistencies.

PG: CNN_DailyMail E1: Conclusion 7.1 Future This research has demonstrated successful results in the user study . Nonetheless particular , the deadlock detection only shows the line number where the threads deadlock . A research is required to determine how to detect atomic variables at the machines code level , especially for different memory consistencies . None

PG: CNN_DailyMail E2: the deadlock detection only shows the line number where the threads deadlock . In regards to ValgrindPlus , more work is needed to support atomic variables . More research is required to determine how to detect atomic variables at the machines code level . None

PG: WikiAll E1: [UNK] is a tool used by computer programmers to measure the detection of atomic variables at the machines code level . It is based on the premise that deadlock detection can be applied to deadlock detection . It is based on the premise that deadlock detection is the problem of finding atomic variables at the machines code level .

PG: WikiAll E2: [UNK] 7.1 Future Work is a [UNK] research research program that aims to improve the quality of atomic variables . It is based on the premise that the user study caused the exact acquisition of atomic variables at the machines code level . It is one of the world 's fastest [UNK] research tools . It is based on the premise that the user study of the atomic variables at the machines code level is needed to support atomic variables . It is an improvement to deadlock detection . In addition to ValgrindPlus , it is an improvement to deadlock detection .

PG: CNN_DailyMail+WikiThesis E1: Conclusion 7.1 Future Work research has demonstrated successful results in the user study . In research is required to determine how to detect atomic variables at the machines code level , especially for different memory consistencies . In research is required to determine how to detect atomic variables at the machines code level , especially for different memory consistencies .

PG: CNN_DailyMail+WikiThesis E2: In 7.1 Future Work This research is a user study of the deadlock detection of atomic variables at the machines code level . In research is required to determine how to detect atomic variables at the machines code level , especially for different memory consistencies . In an improvement to deadlock detection , Valgrind could track which locks are held to indicate the exact acquisition that caused the deadlock . In research is required to determine how to detect deadlock but should also provide help to debug it . As an improvement to deadlock detection , should not only detect deadlock but should support atomic variables .

PG: CNN_DailyMail+WikiAll E1: [UNK] 7.1 Future Work This research is a effective tool used to detect atomic variables at the machines code level , especially for different memory consistencies . In deadlock detection , Valgrind could track which locks are held to indicate the exact acquisition that caused the exact acquisition that caused the deadlock . In research is required to determine how to detect atomic variables at the machines code level , especially for different memory consistencies .

PG: CNN_DailyMail+WikiAll E2: [UNK] computer science , deadlock detection is a tool used to determine the acquisition of atomic variables at the machines code level . [UNK] deadlock detection can be seen as a result of the acquisition of atomic variables at the machines code level . [UNK] deadlock detection can be used to determine the acquisition of atomic variables at the machines code level . [UNK] research is required to determine how to detect atomic variables at the machines code level . [UNK] research is required to determine how to detect atomic variables . In research is required to determine how to detect atomic variables .

What is Failing

The overall results for all our models are not producing high quality results due to the high complexity of ETD summaries. The vocabulary size for the model trained on CNN-Dailymail collection is a major issue, which prevent the model to create relevant information. The model trained on Wikipedia collection has better vocabulary coverage. However, the generated summaries tends to generate introduction like summaries that has an "Wikipedia introduction style", which is not comprehensive. Models trained on combined sources tends to produce worse results instead of improvements.

Conclusion

Answers for our research questions as to pointer-generator network model:

- RQ2: Summaries can be automatically generated with limited information that is related to our target.
- RQ3: The model trained on the Wikipedia collection tends to generate "Wikipedia introduction style" summaries, which is quite different from what is generated from RQ2; The generated summaries covers more vocabulary that is relevant to our ETD collection. However, the relevancy of the generated summaries to our golden standards depends on the content.
- RQ4: The model is not able to combine the good features from models trained on individual resources. The prediction of the model on ETD chapters generally fails.

4.2.3 Fast Abstractive Summarization-RL

The average ROUGE score on our golden standards for Fast Abstractive RL model are given in Table 4.8. From manual inspection of the results, we observed that the summaries generated by the FastAbsRL model has comprehensible grammatical structure. The number of grammatical errors is generally less. It is also possible to make sense out of the sentences, which indicates that this model generates reasonable summaries.

However, we observed that the sentences in the summary generated by this model are not longer than the corresponding sentences in the input document. Further, this model does not form sentences that span two separate sentences of the input document. This is due to the model's innate architecture of first selecting salient sentences from the input document using extractive summarization and subsequently re-writing them to generate the summary. This might cause a situation where the sentences are well formed, but the overall content of the generated summary is different from the reference summary.

Conclusion

Answers for our research questions as to Fast Abstractive RL model:

- RQ2: Summaries can be automatically generated with limited information that is related to our target

- RQ3: This model was not trained on Wikipedia collection.
- RQ4: Since this model was not trained on Wikipedia collection, it is not possible to evaluate it on the combination of partial-local and non-local training data.

Table 4.8: ROUGE Performance: Fast Abstractive RL models

	Rouge		
	1	2	L
CNN-DailyMail	0.23783	0.09704	0.21277

4.3 Conclusion

In this project, we have demonstrated a pipeline for automatically generating chapter level summaries for electronic theses and dissertations. On the one hand, automatic information extraction from ETDs has been shown to be a challenging task from our chapter extraction task with low accuracy through utilizing the best of existing tools. On the other hand, the automatic generation of ETD chapter summaries through supervised deep learning methods has shown to be a more complex and difficult task among existing text summarization tasks without annotated local training data. Nevertheless, we have shown possibilities of using external sources to extract meaningful information from ETDs.

Chapter 5

User Manual

5.1 Where to Get Data

5.1.1 VTechWorks ETD collection

The majority of the ETDs housed in VTechWorks, the Virginia Tech institutional repository maintained by the University Libraries, are open access and can be viewed and downloaded free of charge.

- ETDs: Virginia Tech Electronic Theses and Dissertations:
<http://hdl.handle.net/10919/5534>
- Masters Theses:
<http://hdl.handle.net/10919/9291>
- Doctoral Dissertations:
<http://hdl.handle.net/10919/11041>

5.1.2 Wikipedia Dump

The Wikimedia Foundation does regular Wikipedia Database backup dumps in different formats. In our experiment, we use the latest pages and articles backup. Please find the "enwiki-latest-pages-articles.xml.bz2" file from the link to the latest English Wiki database backups. The data is in XML format and the schema can be found through the Wikimedia dump XML schema. Notice that the XML schema defines the complete

structure for all Wiki dumps; different version of backups may share a subset of the whole schema.

Links to official resources:

- Official Wikimedia Downloads Documentation:
<https://dumps.wikimedia.org/>
- Latest English Wiki Database Backups:
<https://dumps.wikimedia.org/enwiki/latest/>
- Wikimedia dump XML schema:
<https://www.mediawiki.org/xml/export-0.10.xsd>

Gensim Wiki Parser

We use Gensim scripts for extracting plain text out of a raw Wikipedia dump. Use the following command to parse "enwiki-latest-pages-articles.xml.bz2":

```
python -m gensim.scripts.segment_wiki -f  
↪ enwiki-latest-pages-articles.xml.bz2 -o enwiki-latest.json.gz}
```

Command arguments:

- -h show this help message and exit.
- -f path to Wiki dump (read-only).
- -o path to output file (stdout if not specified). If ends in .gz or .bz2, the output file will be automatically compressed (recommended!).
- -w number of parallel workers for multi-core systems. Default: 7.
- -m ignore articles with fewer characters than this (article stubs). Default: 200.

Official Documentation:

https://radimrehurek.com/gensim/scripts/segment_wiki.html

5.1.3 CNN-DailyMail Dataset

CNN-DailyMail dataset is the original dataset used for our different deep learning summarizing models.

Links to official resources:

- Official Github:
<https://github.com/abisee/cnn-dailymail>

On the Github page, you will learn how to download and process the original CNN-DailyMail data. You will also learn how to use the processed data directly.

In our experiments, we use the processed data provided by the official Github page. Our code for processing Wikipedia data into binary format also refers to the code in this repository.

5.2 Grobid

Links to official resources:

- Official Github:
<https://github.com/kermitt2/grobid>
- Official Documentation:
<https://grobid.readthedocs.io/en/latest/References/>
- Release we use:
<https://github.com/kermitt2/grobid/archive/0.5.2.zip>
- Latest Release:
<https://github.com/kermitt2/grobid/releases/>

5.2.1 Installation and Usage

There are various ways to use Grobid: run locally as an application; run locally as a service; run locally through JAVA interface; etc. Here we use the JAR file to run Grobid through the JAVA interface. Please refer to the official documentation for other usage.

- Get the latest JAR release from “Latest Release” link.

- Clone the latest Github repo.
- Use following command to parse your PDF data:

```
java -Xmx4G -jar
↳ /path/to/grobid-core-0.5.2-SNAPSHOT-onejar.jar
↳ -ignoreAssets -r -gH /path/to/github/grobid/grobid-home
↳ -dIn /input/directory/ -dOut /output/directory/ -exe
↳ processFullText
```

Command arguments explanation:

- -gH path to grobid-home directory
- -dIn path to the directory of input PDF files
- -dOut path to the output directory (if omitted in the current directory)
- -ignoreAssets do not extract and save the PDF assets (bitmaps, vector graphics), by default the assets are extracted and saved
- -r recursive processing of files in the sub-directories (by default not recursive)

For other details, please check following manual page:
<https://grobid.readthedocs.io/en/latest/Grobid-batch/>

5.3 Science Parse

5.3.1 Installation and Usage

There are three different ways to get started with Science Parse. Each has its own document:

- Server: This contains the SP server. It's useful for PDF parsing as a service. It's also probably the easiest way to get going. [9]
- CLI: This contains the command line interface to SP. That's most useful for batch processing. [6]

- Core: This contains SP as a library. It has all the extraction code, plus training and evaluation. Both server and CLI use this to do the actual work. [7]

Alternatively, you can run the Docker image:

```
docker run -p 8080:8080 --rm allenai/scienceparse:2.0.1
```

We used the 'cli' version of Science Parse. Following are the steps to get it running:

- Download SBT

```
wget https://piccolo.link/sbt-1.2.4.zip
```

- Unzip it

```
unzip sbt-1.2.4.zip
```

- Set up the path:

```
export PATH=$PATH:~/sbt/bin
```

- In Cascades, load the JDK module:

```
module load jdk/1.8.0u172
```

- Clone the Science Parse github repository

```
git clone https://github.com/allenai/science-parse.git
```

- Change the directory to the cloned repository

```
cd science-parse
```

- Start the build of the fat JAR using SBT:

```
sbt cli/assembly
```

- After the build is complete, change the directory to the built JAR file

```
cd cli/target/scala-2.11
```

- Create a test PDF file to download the pre-trained models:

```
touch test.pdf
```

- Trigger the parser for the first time using this test PDF file. It is ideal to get 6 GB of memory to load the pre-trained models:

```
java -Xmx6g -jar science-parse-cli-assembly-2.0.2-SNAPSHOT.jar  
↪ test.pdf || true
```

- Removing the temporary PDF

```
rm test.pdf
```

- Setup complete.

Use the following command to parse a single PDF file:

```
java -Xmx6g -jar /path/to/science-parse-cli-assembly-2.0.2-SNAPSHOT.jar  
↪ input.pdf
```

Use the following command to parse multiple PDF files:

```
java -Xmx6g -jar  
↪ /path/to/scala-2.11/science-parse-cli-assembly-2.0.2-SNAPSHOT.jar  
↪ <path_to_the_folder_with_PDFs> -o <output_directory_path>
```

Use the following command to know more options:

```
java -Xmx6g -jar  
↪ /path/to/scala-2.11/science-parse-cli-assembly-2.0.2-SNAPSHOT.jar  
↪ --help
```

5.4 Working with Cascades

The task to summarize the ETDs by implementing the deep learning models is a data-intensive task requiring a large amount of memory and storage. We were very fortunate to get access to the *Advanced Research Computing Cascades* system¹. The students were assigned to the BDTScascades allocation to access the systems. The access allowed us to create a maximum of 8 concurrent jobs per user with a wall-time of 144 hours.

¹<https://www.arc.vt.edu/>

5.4.1 Accessing ARC's Cascades Cluster

To login:

```
$ ssh PID@cascades1.arc.vt.edu
```

This will prompt the user to enter the VT PID password, after which an authentication request is pushed to the DUO. Alternatively, the password can be directly appended by the six-digit-DUO-code in the following format:

```
VTPASSWORD,two-factor-six-digit-code
```

5.4.2 Requesting a compute node

Successful authentication will land the user to the login node. Since the login node must not be used for any computation, we must request for a compute node. We can request for the compute node via two ways:

1. Interactive Access

The interactive access to the compute node is a great way to get the code started and find any early stage errors like missing dependencies, syntax errors, etc.

```
interact -l nodes=1:ppn=1:gpus=1 -W  
group_list=cascades -A BDTScascades -q v100_normal_q
```

The above command gives a single node and one processor with one GPU for computation.

2. Job Submission

Access to all compute engines is controlled via the job scheduler. Following is a sample `job.sh` file that requests 2 cores with 1 GPU each:

```
#!/bin/bash  
#PBS -l procs=2,gpus=1  
#PBS -l walltime=100:00:00  
#PBS -q v100_normal_q  
#PBS -A BDTScascades  
#PBS -W group_list=cascades
```

```
# mail is sent to you when the job starts and when it
↳ terminates or aborts
#PBS -m bea
# specify your email address
#PBS -M <your_vt_pid>@vt.edu

module load cuda
cd $PBS_O_WORKDIR

/home/namanahuja/.conda/envs/venv/python file.py
echo "job completed"
exit;
```

5.4.3 Useful Commands

Following is a list of useful commands we explored while working with ARC Cascades:

1. `qsub job.sh`

This command is used to submit the job. After the job is submitted, a JOBID will be assigned to the job. After job completion / interruption two files `job.sh.oJOBID` and `job.sh.eJOBID` will be created which will contain the output and error logs, respectively.

2. `qsub -k oe job.sh`

This command is also used to submit the job. But, as soon as the job's state changes to Running, the output and error logs files are generated. This is really helpful as we can see the current job logs while it is still running.

3. `qsub -Wdepend=afterok:JOBID job.sh`

Sometimes it may be useful to split one large computation into multiple jobs, but submit those jobs all at once or we might want to submit a task that depends on an already running job. We can use the `-Wdepend` to achieve this. For example, in the above command, `job.sh` will be automatically submitted once `JOBID` completes successfully.

4. `checkjob <JOBID>`

This will show the statistics of a job like the resources it is consuming, the nodes that have been assigned, the time consumed by the task, etc.

5. `qdel <JOBID>`

This will delete a running / queued job.

6. `module load <module_name>`

The Cascades modules page² lists the centrally-installed software packages that can be loaded. Examples of some of the available packages are Anaconda, gcc, and JDK.

5.5 Pointer-Summarizer

Point-summarizer is the PyTorch implementation of pointer-generator.

Links to official resources:

- Official Github:
https://github.com/atulkum/pointer_summarizer

5.5.1 Installation and Usage

1. Clone the code from official Github

2. Set up environment for the program

Option 1: Set up the following environment in your preferred way:

- Python 2.7
- PyTorch 3.0
- Tenserflow 1.10

Option 2: Create environment from our provided Conda YML file ³

²<https://www.arc.vt.edu/software/>

³https://github.com/xw0078/CS5984Fall_Team16/tree/master/conda_yaml

3. Find `config.py` file in `data_util` directory
4. Configure parameters in `config.py`
 - `train_data_path`: training data path
 - `eval_data_path`: evaluation data path
 - `decode_data_path`: decode data path
 - `vocab_path`: vocabulary file path
 - `log_root`: output and log path
5. Run the program through the following scripts:
 - `start_train.sh`: run training
 - `start_eval.sh`: run evaluation, provide model path as argument
 - `start_decode.sh`: run decoding, provide model path as argument

Note:

- For "config.py not found" error, add the following code to the file indicated in error message:

```
import sys
sys.path.append('/path/to/pointer-summarizer')
```

5.6 Seq2Seq Model

Links to official resources:

- Official Github:
<https://github.com/zwc12/Summarization>
- Official Documentation:
<https://github.com/zwc12/Summarization/blob/master/README.md>

This model implements a simple sequence-to-sequence model with an Attentional Recurrent Neural Network (RNN) encoder-decoder. [18]

5.6.1 Installation

This model can be used by cloning the latest code from the GitHub repository mentioned above. Once the code has been cloned, the model needs to be trained and then testing can be done by making use of the trained model.

5.6.2 Running on Cascades

The steps to run it on the cluster are:

1. Clone the repository on the cluster
2. Navigate to the bin folder present within the seq2seq folder of the code repository.
3. Replace the existing `train_*.bin` files with the training files that you intend to use to train your model. This can be CNN-DailyMail data (the original data on which the model has been intended to be trained), or the Wikipedia data dump.
4. Create a shell script file indicating the number of CPUs and GPUs that are required along with the Python command to train the file. Include the following in your shell script:

```
python summary.py --mode=train --data_path=bin/train_*.bin
```

5. Once the model has been trained, the output summaries can be tested by creating another shell script. There are two ways to evaluate the summaries, by making use of the `onetime` argument. If this argument is set to true, it runs through the test data only one time and writes the output to a file. If this argument is false, it will run through the test data in an infinite loop.

- (a) Test and write the generated summaries to files

```
python summary.py --mode=decode --data_path=bin/test_*.bin  
↪ --onetime=True
```

- (b) Test and print the generated summaries along with the original article and headline randomly and in a loop

```
python summary.py --mode=decode --data_path=bin/test_*.bin  
↪ --onetime=False
```

6. In order to evaluate the Rouge score of the model, include the following in your shell script

```
python summary.py --mode=eval --data_path=bin/eval_*.bin
```

5.7 Fast Abstractive Summarization-RL

The Github link⁴ to the project provides detailed information about the setup.

5.7.1 Prerequisites

1. Create a Conda environment and install the following dependencies:
 - Gensim
 - tensorboardX
 - Cytoolz
 - Pyrouge
2. If you are working on Cascades, install the PyTorch Linux binaries compiled with CUDA 9.0⁵
3. Clone the project from Github

5.7.2 Execution

1. You can directly decode the pretrained model available in the repository or preprocess the CNN-DailyMail dataset by following the steps outlined⁶
2. To train your model on the Wikipedia corpus, preprocess the dataset by running our code⁷
3. Train a word2vec word embedding by running the following script:

```
python train_word2vec.py --dim=300 --path=[word2vecPath]
```

where dim parameter denotes the dimensionality (default value is 128) and path denotes the path to save the word2vec model.

4. Make the pseudo-labels by running the command:

⁴https://github.com/ChenRocks/fast_abs_rl

⁵<https://pytorch.org/get-started/previous-versions/#pytorch-linux-binaries-compiled-with-cuda-90>

⁶<https://github.com/ChenRocks/cnn-dailymail>

⁷https://github.com/namanahuja/CS5984Fall_Team16/tree/master/FastRL_PreProcessWikiData

```
python make_extraction_labels.py
```

This will create labels in the training and validation dataset and add the arrays *score* and *extracted* to them.

5. Train the *abstractor* and *extractor* using ML objectives:

```
python train_abstractor.py
↳ --path=[path/to/save/abstractor/model]
↳ --w2v=[path/to/word2vec.bin]
```

6. Train the RL model

```
python train_full_rl.py --path=[path/to/save/model]
↳ --abs_dir=[path/to/abstractor/model]
↳ --ext_dir=[path/to/extractor/model]
```

7. Decode the model by running:

```
python decode_full_model.py
↳ --path=[path/to/save/decoded/files]
↳ --model_dir=[path/to/pretrainedRL] --beam= 5 --test
```

5.8 pythonrouge

pythonrouge is a Python wrapper to use ROUGE. We use this package to perform our ROUGE evaluation.

Links to official resources:

- Official Github:
<https://github.com/tagucci/pythonrouge>

Please refer to the following Jupyter notebook on how we use the package: https://github.com/xw0078/CS5984Fall_Team16/blob/master/pipeline/ROUGE_GS_Evaluation.ipynb

Chapter 6

Developer's Manual

6.1 Project Architecture and Inventory

Our source code is hosted in a GitHub repository at https://github.com/xw0078/CS5984Fall_Team16/. This repository is made up of several Python (v. 3.7.0) scripts and Jupyter notebooks organized in separate directories.

- training data scripts — Scripts for managing and manipulating the training corpus
 - `clean_wiki_text.py` — Take out the wiki markup and only leave clean sentences.
 - `doc2vec_similarity.ipynb` — Use doc2vec to find similar Wikipedia articles from ETD chapters
 - `doc2vec_train_wiki_model.py` — Train doc2vec on Wikipedia dump and save models
 - `sentence_tokenization.py` — Extract sentences from Grobid-generated TEI XML
 - `wiki_summary_segmentation.py` — Extract Wikipedia article summary given the `page_name` by using the Wikipedia API.
- pipeline — Training data pipeline: scripts for extracting chapters from TEI, comparing and gathering similar Wikipedia articles, cleaning article text, and generating bin files for training

- `grobid_paragraph_extraction.py` – Parse and transform GROBID TEI into JSON containing title, chapters, and paragraphs
- `Wiki_ETD_Similarity_Extraction.ipynb` – Use doc2vec models to find Wikipedia articles similar to our corpus of ETDs
- `WikiJson_to_PGM_Bin.ipynb` – Convert Wikipedia article JSON into PGM bin files
- `GS_output_name_correct.ipynb` – Maps decoded reference and summary file name to local docno
- `Organize_pg_decoded_summaries.ipynb` – Produce side-by-side comparison in \LaTeX
- `ROUGE_GS_Evaluation.ipynb` – Use PythonRouge for ROUGE evaluation
- Science Parse
 - `setup_science_parse.sh` – Single script to completely set-up Science Parse on remote server (with dependencies)
- CNN-DailyMail bin to CSV – convert bin files to human-readable CSV
 - `cnn_bin_file_to_csv_converter.py` – convert the CNN-DailyMail dataset bin files into a simple CSV file which can also be fed to other networks

6.2 Installation

No installation is necessary. Just clone the repository and run the scripts.

Chapter 7

Lessons Learned

7.1 Timeline

The timeline for developing our project went roughly in the following chronological order:

- Read and perform preliminary experiments
- Manual creation of gold standard summaries
- GROBID processing of all ETDs into TEI documents
- ETD chapter extraction from TEI documents
- Learn Doc2vec embeddings for Wikipedia article dump
- Select Wikipedia articles based on cosine similarity to ETD chapters
- Prepare/Clean up Wikipedia data for training models
- Train deep learning models on Wikipedia data
- Test models and evaluate the data
- Tune models based on results and repeat
- Synthesize results and prepare final report

7.2 Challenges and Limitations

Of course, our study has a few limitations. By far, the most challenging aspect to this project involved identifying and extracting individual chapters from ETD documents (*RQ1*). Overall, Grobid performed well enough for us to proceed with the rest of the project. But while Grobid excels at parsing and structuring academic writing, we expect it has only been trained on short-length research articles (compared to book-length ETDs). Grobid almost always fails to identify and capture every ETD chapter correctly.

Obviously, our results would have been better if we had trained our models on a large set of labelled data for ETD chapters and summaries. Such a dataset was not available. However, we created a few gold standard summaries, which could be used for future research.

Chapter 8

Future Work

8.1 ETD Chapter Extraction

As mentioned in the Challenges and Limitations section above, our current method for automatic chapter extraction needs improvement. In addition to missing some chapters, Grobid sometimes returns noisy data. By improving the extraction quality, the data can serve as more valuable resources for training.

8.1.1 Find and Extract Summaries from ETDs

We observed that several ETDs contain abstract summaries for each chapter. If an automatic and scalable method could be devised to extract these chapter-level abstracts along with the corresponding chapter text, it could be used to produce high quality local training pairs. We leave this for future work.

8.2 Model Tweaking

Our current application on different models is naïve. The hyper-parameters used were optimized for CNN-DailyMail collection specifically. Both the ETD and the Wikipedia collection data are different from CNN-DailyMail in text length and vocabulary size. Better hyper-parameter tweaking specific to the training data set could lead to more accurate results: longer summary length and less unknown tokens.

8.3 Further Cleaning of Wikipedia Data Collection

We observed many defect records in our "cleaned" Wikipedia collection such as containing noisy information instead of text sentences. The reason is that our cleaning process didn't check the quality of each Wikipedia record. For further improvements, we need to develop a quality control and correction process for each Wikipedia record.

8.4 Combine More Training Resources

A small set of gold standard summaries (about 30 ETDs or 150 chapters) have been produced by the three teams working on ETDs. The gold standard summaries can be used as training data in future studies. Additionally, teams 17 and 10 have investigated using the arXiv paper collection¹ and the CMU Book Summary collection² as training data for their models. An interesting idea for future study would be to combine all of these data sets together to train a single model.

¹<https://www.kaggle.com/neelshah18/arxivdataset>

²<https://www.kaggle.com/yamaricar/cmu-book-summary-dataset>

Chapter 9

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Appendix A

Gold Standard Summaries

This appendix lists the gold standard summaries we created manually.

Each person on the team chose one thesis and one dissertation for which they prepared chapter summaries to be used by another team to evaluate their results. What follows is the gold standard summaries we prepared for another team. The summaries are separated by type, thesis or dissertation, then by document, then by chapter. Each document is prefaced with a citation of the thesis or dissertation for which it summarizes and a link to the item in VTechWorks.

A.1 Theses

DELLINGER, E. A. "The Pattern is Movement": Images of Timelessness and Patterns of Response in T.S. Eliot's Four Quartets. Thesis, Virginia Tech, June 2017. <http://hdl.handle.net/10919/78299> <http://hdl.handle.net/10919/78299>

Chapter 1: T.S. Eliot's poem 'Burnt Norton and Reflected Light' which originated from his 1934 visit to an old and burned manor house, explores temporal existence and the search for a meaning, sensed but not understood, outside the boundaries of human finitude, through the lens of motion, both linear and non-linear. Initially, the notion that the mind is capable of viewing time with perpetual possibilities is discussed - the idea of 'what could have happened'. The idea of a rose garden is used to describe this notion; wherein this garden is thought to be inspired by the Garden of Eden. This garden is

intended to symbolize time's denials and contradictions. The poem then describes the idea of searching for the 'heart of light'. Then, ways to escape linear time after exile from the rose garden are illustrated, into the outside world that has been entrapped by time. The poem then descends into a different realm - using the analogy of an underground metro that is dimly lit and aims to create a contrast between the previously explored shadowy unreality of "time-ridden" lives. Further, the poem talks about returning back to the surface, but a black cloud carries the sun away. The transience of words and music (which are also in motion) is also illustrated. The rose garden and the vision of the 'heart of light' that was earlier visited are glimpsed again. Through a set of images, Eliot guides the reader into the beginning of a search for visions of reality's light.

Chapter 2: T.S. Eliot's second poem of the Four Quartets is 'East Coker and the Dance'. While 'Burnt Norton' gives a glimpse outside the linear veneer of time, it presents the problem, of making time stretch before and after, seem to be a waste of time. This poem, East Coker, responds to the problem by delving into this expanse of time before and after, probing into the ridiculousness and seeming endlessness of human limitation in the face of such a moment of vision. It further questions whether existence in time negates the potential of meaningfulness. This question is explored using the image of a dance, which gracefully ties together the motion of time and the stillness of waiting into the search for meaning. Eliot ponders over the cyclicity of life with its perpetual beginning and ending. He also forces the reader to acknowledge the darkness that surrounds everyone and how in this darkness, the 'wisdom of humility' can be found. The poem then discusses the silence of the edges of existence and perception where everything is dark and where even knowledge cannot illuminate this darkness. Thus, what seems like an end, the end of being able to see after entering the darkness, is a part of the dance, and therefore a beginning.

Chapter 3: T.S. Eliot's third poem from the Four Quartets is 'The Dry Salvages and the Clanging Bell'. The previous poem 'East Coker' gives a response to humanity's position within the 'waste sad time,' which leads to the vision of a dance that draws time and timelessness together into meaning. This poem presents a response to this problem on a larger scale. It develops the image of the sea that was illustrated at the end of East Coker more fully. Memories that were significant to Eliot are translated into an image of a sea of time that is incomprehensibly vast, empty, and endless which contrasts the imagery of a river that is "knowable, bridgeable, and comprehensible". Eliot further emphasizes

the need to fight and continue seeking meaning despite the inevitability of failure in the chaos of the sea. Similar to the previous poems, the intersection outside reality with the limited realm of humanity warrants the need for a response, the drive to “fare forward.” The reflected light and dance of the prior two poems, and the clang of the bell here, all are echoes of the Incarnation, pointing to deeper meaning in the midst of exile, darkness, and chaos.

Chapter 4: The last poem from the Four Quartets is ‘Little Gidding.’ It echoes many of the images and ideas found throughout the previous three poems. Within this final poem, Eliot is able to develop a way of approaching the problem of meaning that is both unique to Little Gidding and, at the same time, ties the whole of Four Quartets together in a sense of conclusion and finality. Eliot describes the paradoxical notion of “frost and fire” wherein the frost describes that everything is covered with ice and fire represents “Pentecostal fire”. This image of the “Pentecostal fire” appears near the very beginning of the poem, and it is in the descent of these divine flames into the human world that the other images are tied together and transformed. The response the poem enacts is both the same pattern, and the pattern made new, as the searching in exile of *Burnt Norton*, the waiting in the darkness of *East Coker*, or the faring forward on the sea of *The Dry Salvage*. Here it is a response of embracing renewal and transfiguration by means of fire and purification through the presence of the Pentecostal dove wreathed in flame. Thus, the language and vision of each of the four poems give a different way to understand the search for deeper meaning, tied together in a journey of response that leads us back to the beginning to find we “know the place for the first time.”

MOLINARO, N. J. The Two Point Correlation Structure of a Cylinder Wake. Thesis, Virginia Tech, June 2017. <http://hdl.handle.net/10919/78296> <http://hdl.handle.net/10919/78296>

Chapter 1: The two-point correlation structure and turbulence statistics of a cylinder wake are studied in order to develop accurate prediction methods for an open rotor ingesting turbulence. Understanding wake flow is necessary for understanding the noise produced by a wake generator. Proper Orthogonal Decomposition is used to determine the optimum velocity profile that describes the shape of structures in flow. Two-point correlation functions are used to infer the characteristic eddy structures in each wake using the proper orthogonal decomposition. Comparisons between cylinder structures and airfoil turbulent wake flows will give insight into how and why different inflow conditions produce different sound fields when an open rotor ingests wake flows. Related literature explains the physics of the plane wake including the flow behind a cylinder, universality and self-preservation, and measurements of a NACA 0012 airfoil (studied by Devenport).

Chapter 2: Measurement data was collected at the Virginia Tech Stability Wind Tunnel and the Virginia Tech Open Circuit Wind Tunnel. The first facility is unique in that it can be acoustically quiet without distorting the aerodynamics of the air flow. The model used to generate the wake under investigation in the present study was a machined aluminum circular cylinder with a smooth, near polished surface finish. A computer controlled three-dimensional traverse was used to position probes in the wake of the cylinder to measure wake profiles. The traverses are operated using Matlab code that sets the rake to a desired height in the test section and samples the pressure probes on the rake using an Esterline scanner.

Chapter 3: The two-dimensionality of the cylinder wake was determined to be acceptable at both test locations and the normalized wakes were judged to be similar. More measurements were made in the open circuit wind tunnel than the stability wind tunnel; these were followed by shifting the measurement grid data, correcting for the angle sensitivity of the hotwire probes, and studying hotwire probe coherence. The two-point time delay correlation depends on three spatial coordinates, so quad-hotwire probes were used to measure the three components of velocity in each flow. The full measurement campaign consisted of 19 independent measurements, where each measurement had a unique fixed

probe position. Cylinder wake flow was shown to be substantially more turbulent than the airfoil wake flow, while supporting a very similar mean flow. The two-point correlations showed that structures in the cylinder wake remain coherent to longer time delays and probe separations than those present in the airfoil wake. This suggests that an open rotor ingesting the cylinder wake will produce a very different sound profile than a rotor ingesting an airfoil wake.

Chapter 4: To provide a boundary condition for a larger study, single point measurements were performed in the Virginia Tech Stability Wind Tunnel and Open Circuit Wind Tunnel to document the full two-point correlation tensor of the cylinder wake. The comparisons between Reynolds stress profiles measured in both cylinder wakes and the airfoil wake show that the cylinder wake is substantially more turbulent than the airfoil wake. The cylinder wake is better correlated at larger separations and time delays than the airfoil wake, suggesting that there are stronger and more coherent eddy structures in the cylinder wake. Cylinder and airfoil wake flows show some significant differences in the flow structure. Further investigation is needed to assess how these differences in the flow structures will influence the predicted sound profiles computed using the cylinder and airfoil two-point correlation functions.

NACIRI, W. M. Bug Finding Methods for Multithreaded Student Programming Projects. Thesis, Virginia Tech, Aug. 2017. <http://hdl.handle.net/10919/78675> <http://hdl.handle.net/10919/78675>

Chapter 1: Parallel programming is becoming ubiquitous with an increasing number of cores. Using multithreading, a performance speedup can be experienced due to concurrent execution of threads. Educators' efforts to improve curriculum related to threads can benefit from a special debugging tool to make it easier to program threads, that helps students to better understand bugs and provides a high level description relating to their cause. Past students had expressed difficulty working on fork-join framework; their feedback is a driving factor of the research. Existing debugging tools, such as Helgrind, focus strictly on data-races. They do not identify and describe the high-level root cause of bugs. Willgrind is a special-purpose debugging tool, that is built from scratch using the Valgrind framework, can directly detect bugs and provide high-level descriptions about their cause. WillgrindPlus is a tool that indicate if the student program is vulnerable to a bug that can manifest itself in a different execution. Both Willgrind and WillgrindPlus provide output through an interactive web interface. A user study was performed on Virginia Tech students to evaluate the effectiveness and usefulness of tools. A plethora of different bugs were detected in their submissions.

Chapter 2: In divide and conquer algorithms, a problem is divided into many independent subproblems. These subproblems can be solved independently using a multithreading framework. The fork-join framework, such as for Java (with constructs like future, submit, get, and free) is efficient, simple, and provides regularity. It is taught through programming projects in computer science courses at Virginia Tech. If some threads become idle while others are working, that can reduce the performance of the framework. A work stealing strategy can be used to rectify this problem. To catch bugs, static and dynamic program analysis can be done. Since static program analysis can not catch runtime bugs, it is limited. Valgrind, a dynamic binary instrumentation framework, disassembles the client binary into an intermediate representation, instruments it, and reassembles into machine code using dynamic binary. Valgrind runs as a single thread and the execution of client threads is serialized with, each thread being correctly abstracted and registered with the kernel.

Chapter 3: The shadow values contain useful information to identify bugs, making shadowing a common technique used by dynamic program analysis tools like Willgrind to detect bugs at run-time. Invariants are the conditions that must hold true during the correct execution of a program. Identifying invariant violations can be used to establish the correctness of a program. The run-time code and instrumentation code in Willgrind runs on the host CPU. While the function replacements run in the guest space. Deadlock is a difficult to detect situation where the system does not make progress because threads are blocked forever, such as two threads requesting each other's locks. Willgrind provides accurate deadlock detection by leveraging program-specific knowledge. Since, visualizations speed up the debugging process, in Willgrind the bugs are reported through a friendly web interface.

Chapter 4: WillgrindPlus extends Willgrind, also providing happens before based checking. It does not include semantic violations and deadlock. Happens-before violations indicate a latent failure in the execution. Willgrind has to be run several times to detect a bug; it does nothing when a bug is hidden by the scheduling, limiting its detection by the scheduler. WillgrindPlus rectifies this problem and leverages happens-before based checking to augment detection. Students only need to run the tool a minimal number of times to detect dormant bugs. Vector clocks, each assigned to a process, are used to check happens-before relationships of model future state transitions, ensuring proper thread synchronization exists between the state transitions. Each model future state transition is assigned a vector timestamp (VTS) in order to validate happens-before relationships between transitions. An adjacency matrix is used to represent the happens-before relationships and the Floyd-Warshall algorithm is used to add transitive happens-before relationships. Using lock-free programming, atomic operations are able to concurrently access memory without the use of locks. This influential standard must be considered when designing multithreaded applications. Datarace of WillgrindPlus must be suppressed to support concurrent access to an atomic done flag.

Chapter 5: Performance, effectiveness, and usefulness metrics were included in a user study in Computer Science at Virginia Tech to evaluate Willgrind and WillgrindPlus, comparing with Nullgrind and Helgrind – all four run under the Valgrind framework. Since the execution of threads in Valgrind is serialized, threads can be blocked for extended periods of time when waiting to run, causing performance degradation. To rectify this, the processor affinity of Valgrind should be set for all threads to run on a single

core. The test suite for users is comprised of a medley of familiar divide-and-conquer algorithms and each algorithm is assessed with various sizes and thread counts. The results indicate that the overhead in Willgrind is primarily dominated by the Valgrind recompilation process. Since WillgrindPlus does not check for data-races, a performance improvement is possible by removing unnecessary vector clocks. Effectiveness evaluation to analyze the ability of Willgrind and WillgrindPlus to detect bugs was performed. After analyzing the anonymous code evaluation, a majority of respondents believe the tool definitely helped them detect at least one bug in their code. Additionally, none of the respondents said the tool definitely did not help to catch a bug. Overall, the survey indicated that the tool is important, useful, and credible to the students.

Chapter 7: An analysis tool was developed to make multithreaded programming easier for students. Although the tool gave successful results in the user study, there is some room for improvement. When detecting a deadlock, the tool only identifies the line number where the threads deadlock. Willgrind could track which locks are held to indicate the exact acquisition that caused the deadlock. WillgrindPlus could be enhanced to detect atomic variables for different memory consistencies.

PINTO, S. RTL Functional Test Generation Using Factored Concolic Execution. Thesis, Virginia Tech, July 2017. <http://hdl.handle.net/10919/78397> <http://hdl.handle.net/10919/78397>

Chapter 1: Introduction to Concolic RTL Test Generator which aims to generate tests that maximize branch coverage at the RTL of the design-under-test using the least number of input vectors; Contribution of this thesis considering a cycle-by-cycle concolic execution methodology, a novel test representation, and an efficient factored concolic-execution based automated test generator for RTL. Organization of the whole thesis.

Chapter 2: In this chapter, we explain fundamental concepts and terminology that forms our work. This chapter also surveys and contrasts previous work in the field of test generation at the Register Transfer Level (RTL) using concolic execution and how it relates to the work done in this thesis.

Chapter 3: In this chapter, we introduce a novel concolic execution methodology geared towards rapidly generating tests at the Register Transfer Level (RTL). The goal of this methodology is to generate a multi-cycle sequential test that maximizes branch coverage, in the shortest amount of time. The cycle-by-cycle concolic execution methodology proposed in this thesis offers a significant reduction in functional test generation time. The rest of the chapter is organized as: Terminology for key components; RTL simulation framework; Our cycle-by-cycle concolic execution methodology.

Chapter 4: Concolic execution on its own is hindered by the same limitations of path explosion and computational effort of evaluation over a large number of cycles. The entire Control Flow Graph (CFG) of the design is processed every cycle. As demonstrated in [32], factoring the exploration into a smaller number of cycles and combining the results of each exploration offers a promising avenue to scale. In this chapter, we present, CORT (Concolic RTL Test Generator), a methodology for RTL directed test generation that aims to maximize branch coverage with a minimal number of test vectors, in the shortest amount of time. Our work treats the test generation problem as a task of iteratively building the global Test Decision Tree (TDT) for the design over each exploration. The rest of the chapter is organized as follows. Section 4.1 introduces the paradigm of the Test Decision Tree, along with its construction and interpretation. The CORT framework

is described in detail and the example introduced in Chapter 3 is continued in Section 4.2. Finally, CORT is benchmarked and evaluated against previous work in Section 4.3.

Chapter 5: States the conclusion and limitation of the thesis. In this thesis, we proposed a novel concolic execution methodology for the Register Transfer Level (RTL). We have presented CORT; a factored concolic execution based test generation technique for the Register Transfer Level. Our results show that CORT generates smaller tests with high branch coverage, faster than existing hybrid semi-formal methods.

ROTH, H. M. Smartphone Privacy in Citizen Science. Thesis, Virginia Tech, July 2017. <http://hdl.handle.net/10919/78360> <http://hdl.handle.net/10919/78360>

Chapter 1: Privacy concerns influence acceptance of citizen science, which relates to crowdsourcing, crowdsensing, and groupsensing. This study discusses a potential solution to privacy concerns in Android devices, i.e., a cryptographic group signature scheme. A group sensing prototype GROUPENSE was developed which supports anonymous-yet-accountable crowdsensing in Android devices. A user study was conducted to improve the application, evaluating usability, understanding of the privacy guarantees of group signatures, and whether those would alleviate privacy concerns among citizen science participants.

Chapter 2: Related work and background issues are discussed about crowdsensing platforms, group signatures, threat models, security and privacy goals, and Android mobile computing. Crowdsensing platforms include various architecture components, like group manager, data collector, data obfuscator, MIX network, sensors, and data collection server. They support particular operations like recruitment, task assignment, data submission, revocation, and reward distribution. Using group signature scheme, platform supports anonymous-yet-accountable group sensing. Under threat model, three categories of threats, Data forgery, Identity forgery & Honest data collector are identified and addressed through three security and privacy goals, Accountability, Identity Unforgeability, and Sensing-time Anonymity. Android mobile computing discussed the advantage of Crowdsensing in terms of being cost-effective, perpetuate possibilities of tracking and highlighted the significance of adherence to a systematic and disciplined approach to user security.

Chapter 3: An in-person user study had 22 student participants working with an Android device for 15 minutes using a crowdsensing application, in addition to other use of the device for usual and customary activities. After the user study, a survey gathered demographic information (age, gender, technical background) and had 7 questions (with quantitative responses plus optional comments) about privacy concerns, citizen science, and features of the Android application. It is suggested that participants generally view privacy as important; 82% of participants were willing to install the application on their smartphone.

Chapter 4: The Crowdsensing Android Application collects data from sensors including accelerometer, gravity, gyroscope, linear accelerometer, magnetometer, and rotation. The original interface showed battery life as well as sensing status (stopped, paused, sensing) and had related buttons. Building upon the user study, requirements, design, and implementation of a new user interface led to notifications and more button displays, indicating collecting, signing, or sending data to the data collector.

Chapter 5: GROUPENSE, crowdsensing prototype with Android support, which elevates risks, limitations, and constraints associated with SRBE is proposed with the capability to expand to meet the needs of any group sensing application. It was developed and evaluated through a user study targeting whether the application, through its security features, obviates the privacy concern among participants. Based on findings, modifications were made to the application which includes additional screens and a sophisticated notification system. This work is significant with respect to security as it preserves the movement of provable secure group signatures closer to practical deployment. In future work, an additional user study is suggested with enhancements like a diversified group of respondents, with the difference in their scale and scope. In terms of Application Modifications, a performance boost, changes in the interface in form of a dashboard, financial exchange application, and identity management practices are suggested. It is also highlighted that large-scale crowdsensing applications require more focused efforts in security and privacy as existing privacy-preserving authentication protocols are inadequate.

TIAN, Y. Self-Powered Intelligent Traffic Monitoring Using IR Lidar and Camera. Thesis, Virginia Tech, Feb. 2017. <http://hdl.handle.net/10919/74949> <http://hdl.handle.net/10919/74949>

Chapter 1: The technical contributions of this thesis are summarized as follow: • A traffic monitoring approach that provides reliable traffic information • Formulation of traffic monitoring problem in Kalman Filter framework • A dynamic power management approach based on traffic flow theory that reduces energy cost of traffic monitoring.

Chapter 2: Table 2.2 presents a summary of the three different basic DPM strategies. As suggested, the three strategies are all built based on the understanding of system power consumption and workload property. And for the same system in different functioning stage, different strategies can be implemented. Table 2.2: Comparison of different DPM strategies. DPM strategy Applied case Effect Greedy DPM Service requester required; Maximum power saving; Service request time longer More performance than system wake-up time. degradation risk. Time-out DPM Service requester preferred; Limited power saving; Clearer workload changing Smaller performance pattern. degradation risk. Predictive DPM Service requester preferred; Good power saving; Predictive workload changing. Smaller performance degradation.

Chapter 3: In this chapter, fundamental elements in traffic monitoring are analyzed as the base to develop a reliable traffic monitoring system. After that, urban traffic monitoring problem is formulated by defining what variables are to be measured and estimated. In third section, four traffic measurement procedures that are used in traffic engineering are first presented, followed by how these procedures are realized using different types of sensors. Properties of these two categories of sensors are discussed. The next chapter will present the measuring technique that is used in the developed system.

Chapter 4: In this chapter, the traffic monitoring approach is described in detail. The three detection techniques are firstly introduced. Then, formulation of traffic monitoring in Kalman filter is presented, including state definition, motion model and sensor model. After that, sensor fusion by grid-based method is introduced, followed by how non-Gaussian uncertainty is handled. Finally, the whole traffic information estimation process is summarized and comprehensively explained. The following chapter will discuss about the dynamic power management approach developed for traffic monitoring.

Chapter 5: In this chapter, the developed dynamic power management approach is explained. First, the basic idea of how energy reduction is achieved in traffic monitoring through dynamic power management is introduced. After that, the working process is demonstrated, followed by the formulation of power state machine definition. Finally, power policy of the power state manager is presented. The power policy is reflected through three power state transition. In presenting, the theoretical basis is first explained, followed by the realization in practice. The following chapter will introduce the prototype built to demonstrate both traffic monitoring accuracy and power management efficacy.

Chapter 6: In this chapter, the developed system prototype is presented. Hardware components and structure are first introduced. After that, the installation and calibration of the prototype is also explained. Finally, the power consumption property is measured and tested, based on which the power state machine of the prototype is defined. In the following chapter, experimental and simulation results of the built system is presented.

Chapter 7: After the experimental results and analysis, the following conclusions could be drawn: 1) The developed traffic monitoring system is able to provide reliable traffic flow information including vehicle counts, speed estimation and vehicle classification. In experiments, it was found that by combining Lidar and camera, accuracy of more than 96% adding the number of sensors, an accuracy close to 100% setting up system properly, the error could be reduced to within 1 mph. And for classification, the accuracy is also above 95% 2) The system functions 24 hours and provides reliable data in both day and night. But in comparison between day time and night time, performance in day is better. In daytime, the accuracy of counting is very close to 100% while at night is around 96%. 3) Factors that cause error in measurement fall into multiple categories. But as suggested in the experiment, by fusing information from multiple sensors most of the errors are eliminated. 4) Experiments also suggest that for roads with different properties, system parameters need to be set accordingly.

In this section, multiple simulations have been conducted to evaluate the effect of the three power state transition policies used for dynamic power management. To fully analyze all the policies, parametric study has been done in both day and night, busy and free road, close and far section from traffic lights. Based on the simulations, the power management strategy in the developed traffic monitoring system has shown to be able to reduce a decent amount of energy cost and still achieve reasonable detection accuracy

by proper parameter setting. (1) In power management based on congestion recognition, about 10% of energy cost is saved in sacrifice of only about 5% detection. Because multiple detection is triggered for each individual vehicle, such sacrifice is very close to a neglectable level. (2) In power management based on inter-vehicle power state transition, by properly configuring service-requester, about 12% energy reduction is achieved in sacrifice of no detection missing. (3) Power management based on inter-group state transition have various performance in different traffic condition. For example, its performance at night is much better than in daytime. And to achieve same amount of energy cost reduction, mostly more missing detection would happen.

A.2 Dissertations

DARKO, C. B. *Effects of Storage Conditions of Aspergillus Growth and Aflatoxin Production in Peanuts. A Study in Ghana.* Thesis, Virginia Tech, Feb. 2017. <http://hdl.handle.net/10919/75020> <http://hdl.handle.net/10919/75020>

Chapter 1: Aflatoxins, which are metabolites of aspergillus species, are major contaminants of staple foods like maize and peanuts in developing areas including Sub-Saharan Africa. The fungi producing aflatoxins are present in the soil. aflatoxins contamination of peanuts is a great global concern due to their carcinogenic effect on humans and livestock, as the intake of aflatoxins is known to cause liver cancer, stunted growth in children and immune system disorders. Cold storage facilities and proper moisture control help controlling the problem in developed nations like the USA. Lack of such an environment in Ghana and most African countries is one the reasons that led this problem to aggravate there. Hermetic storage has been proven to be effective for storing agricultural products. But, its effectiveness for controlling aflatoxin growth in agricultural products has not been established. The key objectives are to: investigate the growth of aspergillus and the production of aflatoxin in shelled peanuts under varying treatment and packaging conditions, determine appropriate pre-storage treatments and packaging, and determine the impact of the switch to hermetic storage on peanut farming and marketing profitability in Ghana.

Chapter 2: Peanuts, which are a leguminous crop, are rich in calories and vital nutrients, vitamins, antioxidants, minerals. They have many health benefits. Being a staple food in Ghana, they are highly important for the region. Cancer-causing aflatoxins are secondary metabolites of some aspergillus fungi. Regulations on aflatoxins have been established, to protect humans and animals from their harmful effects. Aflatoxin-producing fungi need favorable temperature, relative humidity and grain moisture conditions to grow and produce toxins. Aflatoxin production can occur in the field prior to harvest also. Both pre and post-harvest aflatoxin contamination may cause losses of Grains. Post harvest peanut activities are conducive for aflatoxin development. Since storage is an important factor to combat the contamination, various storage solutions have been developed. Some of the storage solutions can pose challenges under Ghanaian conditions Chemical and bio-control can leave residues on peanuts during and after storage. Getting

carbon dioxide, nitrogen, and other inert gases to displace oxygen under modified and controlled atmosphere can also be challenging. However, it can meet the goal of finding an appropriate, affordable, and adaptable storage system to help reduce or control aspergillus growth, aflatoxin production, and maintain the quality of peanuts. In addition, packages friendlier to the Ghanaian environment are hermetic storage and active packaging. The type of packaging used for storage can also reduce the rate of lipid oxidation and quality deterioration.

Chapter 3: Studies have shown an escalation of aflatoxigenic fungi growth and aflatoxin production under favorable environmental conditions. Thus, it is important to find storage systems to reduce or eliminate aflatoxin during such conditions. Results indicate that using zero-oxygen hermetic packaging helps suppress aflatoxin production and quality deterioration. Also, partially-roasted-blanch-sorted peanuts show a potential for reducing or eliminating aflatoxin levels during storage. The study has shown that it is best to clean peanuts either by sorting or disinfecting the peanuts before storage. To achieve lower aflatoxin values during storage, it is best to partially roast the peanut samples, blanch them and then sort the bad ones out before storage or processing. Hermetic bags with oxygen absorbers are effective for controlling fungi growth and aflatoxin as well as maintaining quality. Therefore, it is recommended that peanuts be stored hermetically with zero-oxygen in the package.

Chapter 4: Peanuts are used in most developing countries to prevent malnutrition, due to their high protein content. In most developing countries peanuts are infested with fungi, especially *Aspergillus* that produce aflatoxin. The effect of pre-storage treatments and packaging to control aflatoxin production and quality degradation during storage was studied. Partially roasting and blanching peanuts can increase the effectiveness of sorting, and hence aid in reducing aflatoxin along the peanut value-chain. Also, hermetically storing peanuts can suppress the growth of aflatoxigenic fungi and the production of aflatoxin under tropical ambient conditions. Raw clean peanuts can best maintain quality during storage but might still have high aflatoxin levels. Sorting could be a very good method for reducing aflatoxin levels before and during storage. However, hand-sorting consumes time and adds additional preparation cost. Partially roasting, and blanching peanuts, can kill the aflatoxigenic fungi and halt aflatoxin production during storage, and also increase the effectiveness of peanut sorting; thus aiding in reducing or eliminating aflatoxin levels along the peanut value chain. To have low levels of aflatoxin before,

during, and after storage, as well as to maintain peanut quality, it would be best to partially roast peanuts, blanch them, sort out the infested and discolored ones, and then hermetically store the resulting set.

Chapter 5: In Ghana and in other countries Sub-Saharan Africa, aflatoxin fungi infestation causes the post-harvest loss in peanuts. Since polypropylene woven sacks are not airtight, peanuts stored in them are susceptible to fungal and aflatoxin contamination. Studies have shown that hermetic packs can be used effectively to suppress fungi growth, aflatoxin production and quality deterioration in stored peanuts. As the peanut business in Ghana is generally profitable, farmers and traders stand to make additional revenue and profits from switching from traditional packaging to hermetic storage. The study aims to determine if the new hermetic storage technology is more profitable than existing storage methods, before recommending it for peanut farmers and traders. While the new storage technology improves the farmer and trader profitability, it has the potential to reduce the incidence of various ailments that have been attributed to aflatoxins. Hence, the local production and marketing of a hermetic storage system should be encouraged, along with the active creation of awareness of their benefits in reducing the incidence of aflatoxins. In considering the significant national economic impacts of aflatoxins, peanut farmers and traders could be assisted through various financing schemes to acquire the new technology.

Chapter 6: Sorting raw peanuts and storing it hermetically can best maintain quality and suppress aflatoxin production compared to sorted peanuts in polypropylene woven sacks. The best combination for aflatoxin protection is to partially roast, blanch, sort out the infested and discolored peanuts, and hermetically store them.

FORREST, G. L. *Job Satisfaction of Female Superintendents: Role Conflict and Role Commitment*. Thesis, Virginia Tech, Mar. 2017. <http://hdl.handle.net/10919/76741> <http://hdl.handle.net/10919/76741>

Chapter 1: There is a need for qualified school superintendents, but only a small number are suitably qualified. Among those who apply, the percentage of women is very low. Women's leadership styles are different from men but include positive characteristics like inclusiveness, empathy, effective communication up and down the hierarchy, and broader focus. The majority of those in administrative training programs are women, yet few end up as superintendent. The purpose of this study, in Maryland, Virginia, and North Carolina is to examine different factors affecting female superintendents. Among the questions pursued are what is the relationship of job satisfaction with role conflict and role commitment. The hypothesis is that women having greater internal role conflict about balancing home and work roles will be less satisfied with their position as compared to those having greater role commitment (in home and work). This study should be worth noting by policymakers and aspirants.

Chapter 2: The literature analyzed pertinent research that illustrates and investigates the problems and practices related to female superintendents like balancing work and family, underrepresentation, concept of power, qualified but unwilling or uninterested, limited research, job satisfaction, lack of growth, effect of family life on interest or ability and pointed out that a need for further research on female superintendents in general and, particularly, the balance between these women's work and life. In doing so, three themes emerged—1) Affirming Issues, 2) Clarifying Misconstructions, and 3) Leadership Practices of Female Superintendents. While affirming the fact that women should not simply be hired due to their gender, some of the research calls for tearing down a system that can subdue female leaders or aspiring leaders. As an alternative, educators, and particularly educational leaders should be identifying a problem and creatively finding ways to adapt, resulting in a tangible, meaningful, and reasonable solution. In doing so, the conspiracy of silence would no longer be muted.

Chapter 3: The methodology in the study involved design, collection, instrumentation, and analysis. Female superintendents (10 in Maryland, 36 in Virginia, and 23 in North Carolina) were surveyed using three instruments: role conflict scale from Holahan and Gilbert to quantify role conflict, role commitment questions from Napholz to clarify com-

mitments between work and home, and a job satisfaction survey from Spector to create sub-scale scores and a total score, rating overall job satisfaction. Once the results were collected, a multiple regression analysis was run, with job satisfaction as the dependent variable and role conflict and role commitment as independent variables.

Chapter 4: Findings related to the research questions. Demographic and descriptive data are reported before comparing subscales. Data analysis of the relationship among variables found no statistically significant relationship between role conflict and job satisfaction, and the same with role commitment and job satisfaction. For the two independent variables, of role conflict and role commitment, there is no statistically significant relationship between them and the dependent variable, job satisfaction.

Chapter 5: In summary, research hypothesis that superintendents who had greater internal role conflict would be less satisfied with their job was found not to be the case and moreover, no statistically significant relationship between role conflict and role commitment was found so this research fails to reject the null hypothesis. The major conclusion drawn was regarding the direct relationship between role conflict and role commitment, that is school boards do not want employees who are more committed to work having greater internal role conflict.

NOTTINGHAM, L. *Development and Evaluation of Integrated Approaches for Managing of Mexican Bean Beetle, Epilachna varivestis Mulsant*. Thesis, Virginia Tech, Jan. 2017. <http://hdl.handle.net/10919/74881> <http://hdl.handle.net/10919/74881>

Chapter 1: The Mexican bean beetle, *Epilachna varivestis* Mulsant, is an aboveground chewing pest of many commercially grown legumes such as common beans, lima beans, tepary beans, soybeans, alfalfa, beggarweed, and cowpea. Regarding geographical distribution, they are native to western Mexico and Central America, they range over most of the USA and southern Canada, especially in the Mid-Atlantic and Appalachian Mountain regions. Their life cycle (pupa, larva, egg, and adult) proceeds within the canopy of host plants, feeding primarily on leaves and secondarily on pods. Adults have a round body shape, concealed head, and black dorsal spots. Regarding colonization of host plants as well as the susceptibility and resistance among host plants, both thrive similarly as temperature and rainfall vary; overwintered adults can fly long distances to find host plants. Various management techniques have been tried, such as cultural, physical/mechanical, chemical and biological; success had come mostly from resistant crops, reflective plastic mulch, the eulophid wasp, *Pediobius foveolatus*, and chemical controls. The native range and spread of the beetle, fluctuations in pest status, and cause for pest decline indicate that climate change as well as interventions have reduced the threat, but it still is serious. Research objectives cover study related to the beetle, planting snap beans on a highly reflective mulch, and growing snap beans from thiamethoxam-treated seeds.

Chapter 2: The effect of Mexican bean beetle on three types of snap beans, three lima bean cultivars, and one soybean cultivar was evaluated experimentally, considering their susceptibility to the beetle. Most susceptible was the purple wax snap bean, Dragon's Tongue; avoiding planting susceptible cultivars or applying management methods should be considered. Susceptibility decreased from snap beans to lima beans to soybeans. The small-plot field experiments conducted 2013-2016 at Virginia Tech's Kentland Research Farm examined Mexican bean beetle attraction, developmental success, and injury potential to popular snap bean and lima bean cultivars; mark-release-recapture experiments also proceeded there. Greenhouse experiments examined the developmental success of beetle larvae in a controlled setting. JMP was used to analyze the data, which showed a significant effect from the choice of cultivar. Mark-release-capture studies helped when focussing on biological factors; field cage plot experiments yielded the highest number of recaptures.

Chapter 3: Mexican bean beetles are intolerant to direct sunlight and are typically found on the undersides of leaves. Plastic mulch is commonly used for weed control and controlling soil temperature and evaporation. Highly reflective mulches (e.g., with aluminum or silver) have been used to mitigate injury and disease transmission from various insects. Small scale experiments in 2014 and 2015 at Virginia Tech's Kentland Farm tested if Dragon's Tongue snap beans grown on metallized, highly reflective, agricultural polyethylene would have fewer Mexican bean beetles and less injury than those grown on black plastic or bare soil, due to the higher reflected light intensity. Significant reductions in Mexican bean beetle densities and feeding injury were observed in both metalized and white plastic plots compared to black plastic and bare soil. Results suggest that growing snap beans on reflective plastic mulch can suppress the incidence and damage of Mexican bean beetle, and increase yield in snap beans, two times that from white or black plastic, and five times greater than bare soil.

Chapter 4: The neonicotinoid insecticide thiamethoxam, is commonly applied, perhaps over used, as a seed-coating (seed-treatment) to commercial snap beans. Previous studies highlight the efficacy of this seed-treatment in snap beans, however, none have been conducted in agroecosystems where the predominating pest is the Mexican bean beetle. The goal of experiments 2013-2016 at Virginia Tech's Kentland Farm was to quantify effects of growing snap beans from thiamethoxam-treated seed on Mexican bean beetle densities and feeding injury, toxicity to *Podisus maculiventris* (a common predator of the beetle), densities of other arthropods (herbivores and predators), and crop performance. Greenhouse assays showed roughly 90% fatal effects thirteen days after planting, with lower levels after, which led to reduced effect on beetle populations in 4 out of 5 field tests because of delays from seasonal and environmental differences. Though thiamethoxam-treated seeds can provide significant control of Mexican bean beetles and other pests of snap beans, the potential as well as limitations should be considered, along with other management approaches.

Chapter 5: Research starting in 2012 at Virginia Tech's Kentland Farm began with observation, at all life-stages, of heavy Mexican bean beetle infestation of snap bean plants. The serious problems of the 1960s and 1970s in this regard were reduced for large-scale conventional growers, partly since their farms rarely overlapped with the range of the beetle, but there was severe impact in the Appalachian Mountains in non-chemical small to mid-sized farms, determined by surveying growers across the country. This led to a

literature review, screening of cultivars for susceptibility to the beetles, and identification of Dragon's Tongue as highly susceptible. While in snap beans the pest is relatively easy to control using one or two foliar applications of standard insecticides, and thiamethoxam seed-treatments can benefit growers within the range of the Mexican bean beetle, this beetle still poses a problem for organic growers. It was found that the novel management strategy of reflective plastic mulch was effective in reducing injury. Growing a late-season double-crop like lettuce can leverage the expense of the plastic, and choosing other cultivars like Caprice together with a trap crop like Dragon's Tongue, can be effective solutions to the beetle problem.

PENT, G. *Lamb performance, behavior, and body temperatures in hardwood silvopasture systems*. Thesis, Virginia Tech, Mar. 2017. <http://hdl.handle.net/10919/76730> <http://hdl.handle.net/10919/76730>

Chapter 1: This chapter introduces the basic structure of this dissertation. The topic of this dissertation mainly discussed the discovery of effect of shade on animals relating to silvopasture systems and animal welfare. As to shade, benefits of shade on animal productivity in extensive settings are not clear and relevant study should not just focus on productivity. The author propose that shade should be considered as a potential means for alleviating the effects of hot ambient conditions on animal welfare and productivity. The dissertation covers following structure: Animal and forage production in silvopastures, Ruminant response to heat stress in extensive conditions and Effect of shade in mitigating livestock heat stress.

Chapter 2: This chapter covers lamb productivity related to the hardwood silvopastures where the key factors are forage productivity, nutritive value, and species composition. The goal of this study is to determine forage response and lamb performance within hardwood silvopasture systems compared to open pastures. The author compares the silvopasture systems with treeless pastures with cases such as black walnut silvopasture and honeylocust silvopastures. The honeylocust silvopasture supported the same stocking rate as the open pastures, but the black walnut silvopastures, with lower forage availability, supported fewer animals for all three years. Overall, the author find that both of the cases support equivalent lamb live weight gains comparing to conventional open pastures.

Chapter 3: This chapter mainly discusses the behavior of lamb in hardwood silvopastures. In this study, the author compared novel methods animal behavior in pasture systems such as document animal behavior through video and audios. The method is applied to both conventional pasture system and hardwood silvopastures environment. The study analyzed lamb grazing behavior including time lapse and acoustic analysis. The result is showing that lambs preferred shade and perform actively searching for it. Lamb also prefer stay with silvopastures. From the acoustic analysis, no significant differences were found in daily bite counts and bite count by time of day for the lambs. Overall, the study indicates that ambient conditions in the silvopastures were more favorable for grazing than in the open pastures. However, an increased heat tolerance of the lambs

may minimize the difference in grazing behavior between lambs in silvopastures and open pastures.

Chapter 4: This chapter discusses ewe lamb vaginal temperatures in hardwood silvopastures. In this study, intravaginal temperature sensors were constructed from blank controlled internal drug release (CIDR) devices and small temperature loggers. Body temperatures of ewe lambs were recorded within a replicate within a week, and these measures were taken sequentially within three experimental periods. The experiment found out that ewes in the open pasture experienced more fluctuation in day to nighttime core temperature change and lambs in the honeylocust silvopastures displayed increasing vaginal temperatures each month. The lambs in the honeylocust silvopastures had similar vaginal temperatures as to lambs in the open pastures. Overall, Lambs in the silvopastures experienced less amplitude in diurnal temperature variation due to the modulating effect that the shade from the trees had on lamb body temperatures in the silvopastures.

Chapter 5: This chapter discusses lamb productivity during the winter months in honeylocust and black walnut silvopastures. This study aims to determine the effect of honeylocust tree pods on lamb growth when animals grazed stockpiled tall fescue. The study compares the productivity of lambs grazing open pastures and black walnut (*Juglans nigra*) silvopastures in order to get animal performance in honeylocust silvopastures. In result, the net biomass production of forage and pods from the honeylocust silvopastures exceeded the biomass production of the open pastures. The improved weight gains with pod consumption by the lambs indicate that there may be a benefit to live weight gains when honeylocust pods are consumed by lambs in a cool-season forage based system.

STITH, K. M. *A Mixed Methods Study on Evaluations of Virginia's STEM-Focused Governor's Schools*. Thesis, Virginia Tech, Mar. 2017. <http://hdl.handle.net/10919/76735> <http://hdl.handle.net/10919/76735>

Chapter 1: Several underlying theories and models are situated within best practices as identified through scholarly literature and recommended the NAGC. These practices are also supported by the evaluation instrument used by the VDOE. Learning and development, assessment, curriculum planning and instruction, learning environments, programming, and professional development are individual keystones, yet build a supportive bridge between gifted program inputs and program goals.

Chapter 2: A national problem of preparing students for a contemporary society, widely recognized through landmark reports in the 1980's, was confirmed to still exist within the educational system of the United States. Evidence was provided to show that a deficit of STEM literacy has led to a widening gap between scientific and technological developers and average citizens, a threat to global competitiveness, and inability to maintain a future STEM-capable workforce. Though a natural resource of future leaders and innovators, gifted students are often largely ignored in all-inclusive classrooms. To maximize the learning experiences of these gifted students, accelerated and differentiated programs that focus on STEM disciplines have been recognized as a viable solution for the national problem. Though ranging in various frameworks, these programs have a higher rate of students graduating with STEM degrees compared to the national average. The Virginia Governor's Schools provide gifted services to approximately 6,500 students in Virginia with many schools promoting a STEM-focused curriculum. The evaluation procedures of these programs were recognized to play an important role in providing evidence to the effectiveness of these programs and as one solution to the national problem.

Chapter 3: This researcher utilized a convergent mixed methods design to explore multiple sets of data. With data retrieved from the evaluations of five AYGS schools, a descriptive analysis and content analysis were completed to inform Research Questions 1 and 2. Evaluators were recruited to participate in the study and interviewed on their interpretations of best practices for AYGS program standards, thus informing Research Question 3 and six sub-research questions. The researcher subsequently embedded strategies within the study design to establish truthfulness, credibility, dependability, and transferability

into the study. Lastly, the role of the researcher as an educator within the AYGS program was addressed.

Chapter 4: The primary purpose of the study was to collect consequential evidence surrounding an untested rubric used during the evaluations of five STEM-focused Virginia Governor's Schools. In Chapter 4, the quantitative findings were presented in the form of descriptive statistics to address Research Question #1, while the qualitative findings were presented in the form of categories and conclusions to address Research Question #2 and Research Question #3. The descriptive analysis revealed that the collective proficiency levels of the AYGS programs were rated as Doesn't meet standard (n= 19, 6.10%), Meets standard (n= 248, 80%), and Exceeds standard (n=43, 13.87%) for the 62 standards in the 2014 Governor's School Full- Site Evaluation rubric (See Figure 3). The content analysis revealed the following six emergent themes from the findings, commendations, and recommendations of the evaluation reports: (a) supported faculty are a catalyst for program achievement; (b) instructional technology is important for STEM education; (c) stakeholder engagement is fundamental to program success and improvement; (d) out of the classroom and into the world; (e) culture of accomplishment in the classroom; and (f) Opportunities exist for the educational leadership. The thematic analysis uncovered that evaluators envision the "best practices" for gifted students similarly, but personal experiences and pedagogical philosophies lead to more critical evaluation of some standards over others. Evaluators had an overall positive impressions on the evaluation procedures.

Chapter 5: The research questions that directed this study were based upon concerns from stakeholders that the 2014 Governor's School Full-Site Evaluation rubric was an untested instrument that was leading to modifications of programming within the Governor's Schools. The inclusive results of rubric implementation have identified general areas of strengths and weaknesses in program curriculum, professional development, program design, guidance and counseling, identification and selection processes, and facilities amongst the five schools. Evaluators who have used the instrument have similar perceptions and expectations of how AYGS faculty should implement best practices. The conclusion of this study is not to assess the effectiveness of the instrument, but condense major findings to inform evaluation designers of consequential evidence. Major findings of the study are highlighted as follows: (a) the instrument supports the development of the gifted student as an individual; (b) the instrument supports faculty that are committed to building positive relationships, scholarship, and pursuing professional development;

(c) the instrument supports developing STEM-capable students through scientific exploration and civic involvement; and (d) the instrument contains constructs of importance, relevance, and usefulness. (See Table 16) Evaluators were positive in their impressions of the AYGs evaluation procedures and welcomed opportunities to observe the spectrum of strategies implemented to deliver gifted services. The perceptions of best practices were analogous amongst participants and observed incidences of best practices manifested in diverse ways. Recommendations by the researcher are for rubric designers to restructure the rubric to undergo a psychometric assessment and/or ensure the language is evaluative instead of descriptive, modify standards to increase relevancy (e.g. student identification), provide definitions for rubric terminology, and specify what evidence of program actions are to be sought to ensure quality programming.

WYGAL, M. T. *Supporting New Teachers through Induction Programs: New Teacher Perceptions of Mentoring and Instructional Coaching*. Thesis, Virginia Tech, Jan. 2017. <http://hdl.handle.net/10919/74050> <http://hdl.handle.net/10919/74050>

Chapter 1: School districts in the United States are having trouble retaining quality teachers. To address this problem, some school districts are providing early-career teachers with induction programs, which involve mentoring and instructional coaching, both examples of job embedded professional development. This case study evaluates novice elementary school teacher perceptions of the mentoring and instructional coaching programs they experienced in one school district. It also investigates the perception of lead mentors and instructional coaches regarding induction efforts. Data for this study comes from interviews with teachers, feedback forms, and classroom observations.

Chapter 2: Research related to teacher induction programs is reviewed, considering their background, need, purpose, design, and outcomes. Likewise, mentoring and coaching programs are reviewed, and their roles in an induction program. There has been a rapid growth in teacher induction programs, up from 40% in the early 1990s to over 80% in 2006. Induction programs across the country vary in quality, but the literature suggests that teaching is such an extreme challenge that any assistance is helpful. Studies show that induction programs contribute to improvements in teacher quality and retention, and give school districts a positive return on investment. Mentorship programs help build supportive relationships between senior and junior teachers, which is believed to contribute to increased retention and professional commitment. Instructional coaching yields high teacher satisfaction and improvements in teaching practices. Mentorship programs and instructional coaching both can help teachers to feel less isolated, which is a leading cause of teacher attrition.

Chapter 3: Through thematic analysis of interview data, this case study aims to answer the research question of how novice teachers and instructional leaders perceive induction programs involving mentoring and instructional coaching. The study focused on induction programs at two elementary schools in the same school district, housing students in pre-kindergarten through fourth grade, where each had a high degree of recent turnover and new teachers. Data collected for the study was a triangulation of interviews (modeled from Patton) with 4 novice teachers, 2 mentors, and 2 instructional coaches, observational data, and document reviews. Thematic analysis helped discover and syn-

thesize patterns, themes, and categories from the data. Careful considerations ensured the data was collected ethically, and the qualitative analysis was reliable and valid.

Chapter 4: The primary source of data for this study of mentoring and instructional coaching in conjunction with new teacher support came from interviews in 4 elementary schools with four novice teachers, two mentors, and two instructional coaches. There were 3 main findings, regarding classroom procedures to academic achievement, emotional support coupled with academic and instructional guidance, and emotional support vs. academic support. Mentorship helped novice teachers learn the practical things not taught in college, and the everyday operations of a teacher. While mentorship is focused on teacher wellbeing and support, instructional coaching aims at student support and their academic success. Novice teachers indicated feelings of overwhelming isolation. They expressed feeling emotionally supported by their mentors, which helped to fight the feeling of isolation. The subjects' reported perceptions of instructional coaching were also positive. The mentors and instructional coaches reported seeing incredible value in the service they offer to novice teachers. Perceptions were learned about each program to improve their function and importance.

Chapter 5: The study's findings — on mentoring and instructional coaching program components, that novice teachers need emotional support followed by academic and instructional guidance, and the roles of mentors and instructional coaches regarding emotional and academic support — indicate that the induction programs were very similar to what was described in the reviewed literature. It corroborates prior work in reporting novice teachers' feelings of isolation and the stress teachers feel due to the emphasis on testing. The findings show that support first needed to come in the form of emotional support and relationships building through mentorship in order for instructional coaching to be effective. This study provides new insight into how mentor programs and instructional coaching best work together, one providing emotional support while the other provides instructional support. Further research is needed to examine what happens after the induction period concludes, if these findings are also applicable to secondary school teachers, and if aspects of induction programs could be employed as part of university curriculum. Overall, this study found that having an induction program that includes both mentoring and instructional coaching can help school districts retain new teachers. Further work could enhance the consistency of mentoring programs, and ensure balance in the level of support provided.

Appendix B

Comparing Pointer-Generator Auto-Generated Summaries with Gold Standards

This appendix provides side-by-side comparisons of the gold standard summaries and the summaries produced by our PG models.

WYGAL, M. T. *Supporting New Teachers through Induction Programs: New Teacher Perceptions of Mentoring and Instructional Coaching*. Thesis, Virginia Tech, Jan. 2017. <http://hdl.handle.net/10919/74050>

Chapter 1

Gold standard summary: School districts in the United States are having trouble retaining quality teachers. To address this problem, some school districts are providing early-career teachers with induction programs, which involve mentoring and instructional coaching, both examples of job embedded professional development. This case study evaluates novice elementary school teacher perceptions of the mentoring and instructional coaching programs they experienced in one school district. It also investigates the perception of lead mentors and instructional coaches regarding induction efforts. Data for this study comes from interviews with teachers, feedback forms, and classroom observations.

PG: CNN_DailyMail E1: new teachers start with a pre-service form of education , followed by an induction process which takes teachers to their early career stage -LRB- Luft , Gillian . new teachers have the potential to reach the culmination of their teaching career , which is being a master teacher -LRB- Luft . None

PG: CNN_DailyMail E2: They write lesson plans , teach and maintain behaviors , confront growing poverty in many schools , align state curriculums to local districts pacing guides . These tasks can be very overwhelming for a teacher just starting their career . Due , the new teachers start with a pre-service form of education , followed by an induction process which takes teachers to their early career stage -LRB- Luft , Gillian , Patterson , 2003 -RRB- . None

PG: WikiAll E1: A quality educator is a type of quality educator in the United States . It is a part of the field of education in the United States . It is a part of the United States Department of Education -LRB- [UNK] -RRB- , the United States Department of Education -LRB- [UNK] -RRB- , the United States Department of Education -LRB- [UNK] -RRB- , the United States Department of Education -LRB- [UNK] -RRB- , and the United States Department of Education -LRB- [UNK] -RRB- .

PG: WikiAll E2: The United States Department of Education -LRB- Induction -RRB- is a nonprofit organization based in [UNK] , United States . It is one of the oldest schools in the world devoted to the field of education in the United States . The United States Department of Education -LRB- [UNK] -RRB- was established in 2002 as a part of the United States Department of Education -LRB- [UNK] -RRB- . The United States Department of Education -LRB- [UNK] -RRB- was established by the United States National Advisory Committee for the Advancement of Science and Technology -LRB- [UNK] -RRB- , and the United States Department of Education -LRB- [UNK] -RRB- .

PG: CNN_DailyMail+WikiThesis E1: Background of Study Experienced educators regard education to be a challenging , yet rewarding , field . They write lesson plans , teach and maintain behaviors , confront growing poverty in many schools , align state curriculums to local districts pacing guides , and complete a myriad of other daily functions that fall in the job description of a quality educator .

WYGAL, M. T. *Supporting New Teachers through Induction Programs: New Teacher Perceptions of Mentoring and Instructional Coaching*. Thesis, Virginia Tech, Jan. 2017. <http://hdl.handle.net/10919/74050>

Chapter 2

Gold standard summary: Research related to teacher induction programs is reviewed, considering their background, need, purpose, design, and outcomes. Likewise, mentoring and coaching programs are reviewed, and their roles in an induction program. There has been a rapid growth in teacher induction programs, up from 40 in the early 1990s to over 80 in 2006. Induction programs across the country vary in quality, but the literature suggests that teaching is such an extreme challenge that any assistance is helpful. Studies show that induction programs contribute to improvements in teacher quality and retention, and give school districts a positive return on investment. Mentorship programs help build supportive relationships between senior and junior teachers, which is believed to contribute to increased retention and professional commitment. Instructional coaching yields high teacher satisfaction and improvements in teaching practices. Mentorship programs and instructional coaching both can help teachers to feel less isolated, which is a leading cause of teacher attrition.

PG: CNN_DailyMail E1: Induction Programs Induction Induction Induction programs are essentially a comprehensive introduction to teaching for new teachers just entering the field of education . Induction programs are essentially a comprehensive introduction to teaching for new teachers just entering the field of education . Induction programs are essentially a comprehensive introduction to teaching for new teachers just entering the field of education . None

PG: CNN_DailyMail E2: new teacher induction mentoring and instructional coaching programs will be investigated for their role in the new teacher induction process . More will consider research and scholarship about the background , purpose , design , need and outcomes of induction coaching programs . Finally has been a rapid growth of teacher induction programs in recent decades to help new teachers overcome the challenges . None

WYGAL, M. T. *Supporting New Teachers through Induction Programs: New Teacher Perceptions of Mentoring and Instructional Coaching*. Thesis, Virginia Tech, Jan. 2017. <http://hdl.handle.net/10919/74050>

Chapter 3

Gold standard summary: Through thematic analysis of interview data, this case study aims to answer the research question of how novice teachers and instructional leaders perceive induction programs involving mentoring and instructional coaching. The study focused on induction programs at two elementary schools in the same school district, housing students in pre-kindergarten through fourth grade, where each had a high degree of recent turnover and new teachers. Data collected for the study was a triangulation of interviews (modeled from Patton) with 4 novice teachers, 2 mentors, and 2 instructional coaches, observational data, and document reviews. Thematic analysis helped discover and synthesize patterns, themes, and categories from the data. Careful considerations ensured the data was collected ethically, and the qualitative analysis was reliable and valid.

PG: CNN_DailyMail E1: Methodology programs are intended to support new-comers ' teaching abilities and enable new-comer teachers the opportunity to be as successful as possible . This programs are intended to support new-comers ' teaching abilities and enable new-comer teachers the opportunity to be as successful as possible . None

PG: CNN_DailyMail E2: This leads to frequent turnover and expensive , time consuming recruitment efforts for school districts . These programs are intended to support new-comers ' teaching abilities . It provide a solid understanding of the components of the induction program , perceptions of mentors and coaches were studied . None

PG: WikiAll E1: The Methodology School of Methodology is one of the leading experts in the field of teacher support . It is a part of the Methodology School of Methodology . It is a part of the Association of Colleges and Universities -LRB- [UNK] -RRB- in the United States and Canada . It is a member of the Association of Colleges and Universities -LRB- [UNK] -RRB- .

PG: WikiAll E2: A school district is a school district in New Venland , United States . It is a part of New Venland Public Schools -LRB- NVPS -RRB- , in the mid-Atlantic region of the United States . It is a part of the State ' s Department of Education -LRB- [UNK] -RRB- . It is a part of the United States Department of Education -LRB- [UNK] -RRB- . It is a part of the United States Department of Education -LRB- [UNK] -RRB- . It is a part of the United States Department of Education -LRB- [UNK] -RRB- . It is a part of the United States Department of Education -LRB- [UNK] -RRB- .

PG: CNN_DailyMail+WikiThesis E1: This programs are one way that districts address this turnover issue . This leads to frequent turnover and expensive , time consuming recruitment efforts for school districts . This study looked at two specific components of induction programs ; mentoring and instructional coaching .

PG: CNN_DailyMail+WikiThesis E2: study at qualitative school district is a suburban school system in the mid-Atlantic region of the United States . The programs are intended to support new-comers ' teaching abilities and enable new-comer teachers the opportunity to be as successful as possible . This leads to frequent turnover and expensive , time consuming recruitment efforts for school districts . This programs are intended to support new-comers ' teaching abilities . This research allows for the primary form of data collection to be through interviews , with triangulation of results , which leads to clear themes coming forward and findings regarding new teacher support .

PG: CNN_DailyMail+WikiAll E1: [UNK] [UNK] [UNK] [UNK] [UNK] -RRB- -RRB- is a research methodology that focuses on the study of mentoring and instructional coaching and instructional coaching experiences . [UNK] study focuses on participants ' perceptions of mentoring and instructional coaching experiences . [UNK] research focuses on participants ' perceptions of mentoring and instructional coaching experiences . [UNK] research focuses on participants ' perceptions of mentoring and instructional coaching experiences . [UNK] research focuses on participants ' perceptions of mentoring and instructional coaching experiences .

WYGAL, M. T. *Supporting New Teachers through Induction Programs: New Teacher Perceptions of Mentoring and Instructional Coaching*. Thesis, Virginia Tech, Jan. 2017. <http://hdl.handle.net/10919/74050>

Chapter 4

Gold standard summary: The primary source of data for this study of mentoring and instructional coaching in conjunction with new teacher support came from interviews in 4 elementary schools with four novice teachers, two mentors, and two instructional coaches. There were 3 main findings, regarding classroom procedures to academic achievement, emotional support coupled with academic and instructional guidance, and emotional support vs. academic support. Mentorship helped novice teachers learn the practical things not taught in college, and the everyday operations of a teacher. While mentorship is focused on teacher wellbeing and support, instructional coaching aims at student support and their academic success. Novice teachers indicated feelings of overwhelming isolation. They expressed feeling emotionally supported by their mentors, which helped to fight the feeling of isolation. The subjects' reported perceptions of instructional coaching were also positive. The mentors and instructional coaches reported seeing incredible value in the service they offer to novice teachers. Perceptions were learned about each program to improve their function and importance.

PG: CNN_DailyMail E1: Novice exist through a variety of venues , such as a buddy teacher , a mentor , and instructional coach . There are the perceptions of mentoring and instructional coaching . mentoring and instructional coaching as new elementary teacher support in NVPS ? None

PG: CNN_DailyMail E2: Novice shortages are occurring in the nation , but these shortages could be offset by having novice teachers stay in the field of education within their first five years of teaching . Teachers are a variety of ways to support new teachers which are part of the induction process . Two are the perceptions of mentoring and instructional coaching as new elementary teacher support in NVPS ? None

PG: WikiAll E1: A Novice teacher is a teacher who is interested in the field of education in the United States and Canada . It is a part of the broader field of instructional coaching , and is a part of the broader field of instructional coaching .

PG: CNN_DailyMail+WikiAll E2: [UNK] is a branch of education that focuses on the study of new teachers and instructional coaching programs . [UNK] research focuses on the development of teachers and instructional coaches . [UNK] research focuses on the development of new teachers and instructional coaching programs . [UNK] research focuses on the development of new teachers and instructional coaching programs . [UNK] research focuses on the development of new teachers and instructional coaching programs . [UNK] research focuses on the development of new teachers and instructional coaching programs . [UNK] research focuses on the development of new teachers and instructional coaching programs . [UNK] research focuses on the development of new teachers and instructional coaching programs . [UNK] research focuses on the development of new teachers and instructional coaches .

WYGAL, M. T. *Supporting New Teachers through Induction Programs: New Teacher Perceptions of Mentoring and Instructional Coaching*. Thesis, Virginia Tech, Jan. 2017. <http://hdl.handle.net/10919/74050>

Chapter 5

Gold standard summary: The study's findings – on mentoring and instructional coaching program components, that novice teachers need emotional support followed by academic and instructional guidance, and the roles of mentors and instructional coaches regarding emotional and academic support – indicate that the induction programs were very similar to what was described in the reviewed literature. It corroborates prior work in reporting novice teachers' feelings of isolation and the stress teachers feel due to the emphasis on testing. The findings show that support first needed to come in the form of emotional support and relationships building through mentorship in order for instructional coaching to be effective. This study provides new insight into how mentor programs and instructional coaching best work together, one providing emotional support while the other provides instructional support. Further research is needed to examine what happens after the induction period concludes, if these findings are also applicable to secondary school teachers, and if aspects of induction programs could be employed as part of university curriculum. Overall, this study found that having an induction program that includes both mentoring and instructional coaching can help school districts retain new teachers. Further work could enhance the consistency of mentoring programs, and ensure balance in the level of support provided.

PG: CNN_DailyMail E1: In Chapter one , I discussed teacher shortages in the nation and why novice teachers need support and guidance when entering this challenging career . This Chapter two , I examined research on two primary types of induction programs : mentoring and instructional coaching . None

PG: CNN_DailyMail E2: teachers are often leaving the field of education within their first five years of teaching . Chapter chapter set the basis for the purpose of this study and the need to examine support for new teachers throughout their first few years of teaching . Chapter in Chapter one were types of supports that new teachers may encounter in their induction process . None

PG: WikiAll E1: In the United States , an induction program is a type of induction program that can be used to assist in the education of new teachers . It is a part of the field of education within the United States Department of Education . In the United States , the United States Department of Education -LRB- [UNK] -RRB- is a part of the United States Department of Education -LRB- [UNK] -RRB- of the United States Department of Education .

PG: WikiAll E2: Emotional Support vs Academic Support -LRB- NVPS -RRB- is a non-profit organization based in the United States dedicated to the study of teachers in the United States . It was established in 2004 . It was established in 2004 . It was founded in 2004 . It was founded in 2007 by [UNK] Smith , and is based on the study of the [UNK] school system . It was founded in 2004 and is based on the study of the study of the [UNK] school system . It was founded in 2004 . The program was established in 2004 .

PG: CNN_DailyMail+WikiThesis E1: [UNK] in Chapter one of the study 's induction programs . [UNK] in chapter three were the procedures for the study and steps to analyze the data that would take place . This in chapter three were the procedures for the study and steps to analyze the data that would take place . This case study of NVPS highlighted and described and the perceptions that novice teachers held toward the new teacher induction process within NVPS .

Gold standard summary: The Mexican bean beetle, *Epilachna varivestis* Mulsant, is an aboveground chewing pest of many commercially grown legumes such as common beans, lima beans, tepary beans, soybeans, alfalfa, beggarweed, and cowpea. Regarding geographical distribution, they are native to western Mexico and Central America, they range over most of the USA and southern Canada, especially in the Mid-Atlantic and Appalachian Mountain regions. Their life cycle (pupa, larva, egg, and adult) proceeds within the canopy of host plants, feeding primarily on leaves and secondarily on pods. Adults have a round body shape, concealed head, and black dorsal spots. Regarding colonization of host plants as well as the susceptibility and resistance among host plants, both thrive similarly as temperature and rainfall vary; overwintered adults can fly long distances to find host plants. Various management techniques have been tried, such as cultural, physical/mechanical, chemical and biological; success had come mostly from resistant crops, reflective plastic mulch, the eulophid wasp, *Pediobius foveolatus*, and chemical controls. The native range and spread of the beetle, fluctuations in pest status, and cause for pest decline indicate that climate change as well as interventions have reduced the threat, but it still is serious. Research objectives cover study related to the beetle, planting snap beans on a highly reflective mulch, and growing snap beans from thiamethoxam-treated seeds.

PG: CNN_DailyMail E1: *Epilachna varivestis* Mulsant is an aboveground chewing pest -LRB- . The native range of Mexican bean beetle is thought to be in the high elevations . Damaging populations are most common in the Mid - Atlantic current range includes most of the United States and southern Canada Mountain regions . None

PG: CNN_DailyMail E2: Mexican bean beetle is thought to be in the high elevations of western Mexico and Central America . The populations are most common in the Mid - due to moderate summer temperatures -LRB- high , day-time temperatures between 25 and 29.5 °C 77 and 85 °F -RSB- -RRB- . the distribution is unknown -LRB- Howard and English 1924 -RRB- . Larvae are usually smaller than females , and can be distinguished by a notch at the end of the last abdominal segment -LRB- Figure 1.5 -RRB- . None

PG: WikiAll E1: The Mexican bean beetle -LRB- “ [UNK] [UNK] ” -RRB- , also known as the Mexican bean beetle , is a species of legume beetle that is native to the southeastern United States . It is one of the world ’s most widely cultivated legumes .

PG: WikiAll E2: The Mexican bean beetle -LRB- “ [UNK] [UNK] ” -RRB- , also known as the Mexican bean beetle , is a species of beetle in the family [UNK] . It is native to the United States and Central America . It is native to western North America , where it is commonly found in western North America . It is one of the world ’s most common [UNK] species . It is native to western North America , where it is the most common cause of Mexican bean beetle in the United States . It is native to the United States and Canada .

PG: CNN_DailyMail+WikiThesis E1: Mexican bean beetle is a [UNK] chewing pest of many commercially grown legumes -LRB- . The bean beetle is thought to be in the high elevations of western Mexico and Central America . Damaging current range includes tepary beans -LRB- Phaseolus -RRB- , common beans -LRB- .

PG: CNN_DailyMail+WikiThesis E2: Mexican bean beetle is a [UNK] chewing pest of many commercially grown legumes -LRB- Fabaceae -RRB- . The are most common in the Mid - Atlantic and southern Appalachian Mountain Marcovitch and Stanley 1930 , Nicholas 1931 , Bernhardt 1930 , Barrigossi 1997 -RRB- . Larvae are light yellow when first deposited -LRB- Figure 1.1 -RRB- , due to fall -LRB- Howard and English 1924 -RRB- in the late spring or early summer to feed and mate -LRB- Friend and Turner 1931 -RRB- . Larvae are similar in general appearance to larvae ; however , adults can fly long distances to find host plants after overwintering , disperse when populations become crowded .

PG: CNN_DailyMail+WikiAll E1: Mexican bean beetle is a species of beetle in the family [UNK] . [UNK] may occur in the late spring or early summer to early summer to feed and mate -LRB- Friend and English 1924 -RRB- . The populations are most common in the high elevations of western Mexico .

PG: CNN_DailyMail+WikiAll E2: Mexican bean beetle , also known as Mexican bean beetle , is a species of bean beetle in the family [UNK] . [UNK] is native to the [UNK] [UNK] [UNK] [UNK] and [UNK] [UNK] [UNK] . [UNK] is a member of the genus “ [UNK] ” . [UNK] is a member of the genus “ [UNK] [UNK] ” . [UNK] is native to the [UNK] [UNK] [UNK] [UNK] and [UNK] [UNK] [UNK] [UNK] -RRB- . [UNK] is a member of the genus “ [UNK] [UNK] ” . [UNK] is native to the [UNK] [UNK] [UNK] and [UNK] [UNK] [UNK] .

PG: WikiAll E2: Mexican bean beetle -LRB- “ [UNK] [UNK] ” -RRB- , also known as Mexican bean beetle , Mexican bean beetle , Mexican bean beetle , Mexican bean beetle , Mexican bean beetle , Mexican bean beetle , and Mexican bean beetle , is a species of Mexican bean beetle that is native to Europe and Asia . It is native to the range of Mexican bean beetle and Mexican bean beetle -LRB- “ [UNK] [UNK] [UNK] ” -RRB- . This species is native to the range of Mexican [UNK] and Mexican bean beetle . It is native to the United States and Canada .

PG: CNN_DailyMail+WikiThesis E1: Mexican bean beetle is a [UNK] bean beetle . Mexican bean beetle is the most suitable host species to Mexican bean beetle feeding and development . Mexican bean beetle ’s developmental and reproductive success varies among host plant species and cultivars . Among bean beetle is the most suitable host species to Mexican bean beetle feeding and development .

PG: CNN_DailyMail+WikiThesis E2: [UNK] bean beetle is a host of snap beans and snap beans and lima beans . [UNK] are the most suitable host species to Mexican bean beetle feeding and development , and the most susceptible to feeding injury than lima beans -LRB- Howard and English 1931 -RRB- . Smallplot plants that are less susceptible to injury include soybean , Glycine max Merrill , scarlet runner bean , Phaseolus coccineus L. , and lima beans , Phaseolus and English 1924 -RRB- . snap beans and lima beans are highly susceptible to injury by Mexican bean beetle , and nearly all “ wax bean ” -LRB- snap beans with yellow pods -RRB- cultivars were highly susceptible to injury by hand .

PG: CNN_DailyMail+WikiAll E1: Mexican bean beetle , also known as the [UNK] bean beetle , is a species of beetle in the family [UNK] . [UNK] is native to the [UNK] [UNK] and [UNK] [UNK] [UNK] . [UNK] bean beetle is a member of the genus “ [UNK] ” .

PG: CNN_DailyMail+WikiAll E2: Mexican bean beetle , also known as [UNK] bean beetle , is a species of bean beetle in the family [UNK] . [UNK] is native to the [UNK] [UNK] and [UNK] [UNK] [UNK] . [UNK] bean beetle is the most common host of Mexican bean beetle . [UNK] bean beetle is also known as the [UNK] bean beetle . [UNK] bean beetle is also known as the [UNK] bean beetle . [UNK] bean beetle is a part of the [UNK] bean beetle , and is the most susceptible to Mexican bean beetle . [UNK] bean beetle is also known as [UNK] bean beetle .

NOTTINGHAM, L. *Development and Evaluation of Integrated Approaches for Managing of Mexican Bean Beetle, Epilachna varivestis Mulsant*. Thesis, Virginia Tech, Jan. 2017. <http://hdl.handle.net/10919/74881>

Chapter 3

Gold standard summary: Mexican bean beetles are intolerant to direct sunlight and are typically found on the undersides of leaves. Plastic mulch is commonly used for weed control and controlling soil temperature and evaporation. Highly reflective mulches (e.g., with aluminum or silver) have been used to mitigate injury and disease transmission from various insects. Small scale experiments in 2014 and 2015 at Virginia Tech’s Kentland Farm tested if Dragon’s Tongue snap beans grown on metallized, highly reflective, agricultural polyethylene would have fewer Mexican bean beetles and less injury than those grown on black plastic or bare soil, due to the higher reflected light intensity. Significant reductions in Mexican bean beetle densities and feeding injury were observed in both metalized and white plastic plots compared to black plastic and bare soil. Results suggest that growing snap beans on reflective plastic mulch can suppress the incidence and damage of Mexican bean beetle, and increase yield in snap beans, two times that from white or black plastic, and five times greater than bare soil.

PG: CNN_DailyMail E1: many legumes -LRB- -RRB- -RRB- -RRB- -RRB- are scars . the U.S. and southern Appalachian Mountain regions of the United States , where Mexican bean beetle outbreaks on a small to medium-sized farm scale , and often organic systems . None

PG: CNN_DailyMail E2: Mexican bean beetle is found throughout the U.S. , it is most common and severe in the Mid-Atlantic and southern Appalachian Mountain regions -LRB- Nottingham et al. 2016 -RRB- . Adults and larvae use chewing mouthparts to dislodge tissue from leaves and pods , then compress the tissue to extract and consume plant juices -LRB- Howard 1941 -RRB- . Many to mid-sized producers are more likely to employ non-chemical methods for pest control . None

PG: WikiAll E1: The Mexican bean beetle -LRB- “ [UNK] [UNK] ” -RRB- , also known as the Mexican bean beetle , is a species of lady beetle . It is native to the southeastern United States . It is one of the world ’s most widely cultivated lady beetle .

NOTTINGHAM, L. *Development and Evaluation of Integrated Approaches for Managing of Mexican Bean Beetle, Epilachna varivestis Mulsant*. Thesis, Virginia Tech, Jan. 2017. <http://hdl.handle.net/10919/74881>

Chapter 4

Gold standard summary: The neonicotinoid insecticide thiamethoxam, is commonly applied, perhaps over used, as a seed-coating (seed-treatment) to commercial snap beans. Previous studies highlight the efficacy of this seed-treatment in snap beans, however, none have been conducted in agroecosystems where the predominating pest is the Mexican bean beetle. The goal of experiments 2013-2016 at Virginia Tech’s Kentland Farm was to quantify effects of growing snap beans from thiamethoxam-treated seed on Mexican bean beetle densities and feeding injury, toxicity to *Podisus maculiventris* (a common predator of the beetle), densities of other arthropods (herbivores and predators), and crop performance. Greenhouse assays showed roughly 90 fatal effects thirteen days after planting, with lower levels after, which led to reduced effect on beetle populations in 4 out of 5 field tests because of delays from seasonal and environmental differences. Though thiamethoxam-treated seeds can provide significant control of Mexican bean beetles and other pests of snap beans, the potential as well as limitations should be considered, along with other management approaches.

PG: CNN_DailyMail E1: The use of neonicotinoid insecticides as a seed-coating -LRB- “ seed-treatments ” -RRB- are prolific in commercial agriculture , due to their ease of use and Tooker 2015 -RRB- . This are pretreated by manufacturers with lower rates of active ingredient compared to growers for multiple reasons . Seeds are pretreated by manufacturers with lower rates of active ingredient compared to in-furrow sprays , and foliar et al. 2001 -RRB- . None

PG: CNN_DailyMail E2: Neonicotinoid are pretreated by manufacturers with lower rates of active ingredient compared to in-furrow sprays , soil drenches , and foliar applications -LRB- Taylor et al. 2015 -RRB- . This are pretreated by manufacturers with lower rates of active ingredient compared to in-furrow sprays and Tooker 2015 -RRB- . None

PG: WikiAll E1: Neonicotinoid seed-treatments is a type of insecticide , which is used as a broad-spectrum insecticide . It is one of the most widely used insecticides in the United States and Canada . It is one of the most common insecticides in the United States .

PG: WikiAll E2: [UNK] insecticides -LRB- also known as [UNK] insecticides -RRB- are a class of drugs used in the treatment of insecticides , herbicides , and other plant pests . It is the most common type of insecticides in the United States and Canada -LRB- [UNK] et al. 2015 -RRB- . It is one of the most common insecticides in commercial agriculture . It is the most widely used insecticide in the United States , Canada , United Kingdom , Canada , Japan , Japan , Japan , Japan , Japan , Japan , Japan , Japan , Japan , China , Japan , China , Russia , the United Kingdom , Canada , Russia , the United Kingdom , Canada , Russia , the United Kingdom , Canada , Russia , the United Kingdom , Canada , Russia , the United Kingdom , and Mexico .

PG: CNN_DailyMail+WikiThesis E1: [UNK] insecticides is a [UNK] -LRB- insecticide . [UNK] is a [UNK] -LRB- insecticide . [UNK] is a [UNK] -LRB- insecticide . [UNK] is a [UNK] -LRB- insecticide . [UNK] is a [UNK] -LRB- insecticide .

PG: CNN_DailyMail+WikiThesis E2: [UNK] insecticides is a pest of snap beans in the same way of the snap beans . [UNK] are [UNK] by manufacturers with lower rates of active ingredient compared to in-furrow sprays , soil drenches , and foliar applications against early season pests -LRB- Douglas and Tooker 2015 -RRB- . This method is under scrutiny because of wide-scale implementation and potential non-target effects . Neonicotinoids goals of the experiments herein were to quantify the effects of thiamethoxam-treated snap beans in agroecosystems dominated by this pest . ‘ Caprice ’ snap beans were purchased from the distributor as untreated -LRB- UT -RRB- at the beginning of each year .

PG: CNN_DailyMail+WikiAll E1: [UNK] is a form of agriculture that is used to treat plants . [UNK] use of neonicotinoid insecticides applied as a seed-coating -LRB- “ seed-treatments ” -RRB- . [UNK] are prolific in commercial agriculture , due to their ease of use and efficacy against early season pests -LRB- Douglas and Tooker 2015 -RRB- . This method , however , is under scrutiny because of wide-scale implementation and potential non-target effects .

PG: CNN_DailyMail+WikiAll E2: [UNK] bean beetle , also known as the [UNK] bean beetle , is a species of beetle in the family [UNK] . [UNK] is native to the [UNK] [UNK] of the [UNK] U.S. and [UNK] [UNK] . [UNK] is the most common type of bean beetle in the genus “ [UNK] ” . [UNK] has been shown to trigger physiological stress responses of plants , increasing plant health factors that may be unrelated to pest pressure -LRB-Douglas and Tooker 2015 -RRB- . [UNK] method is under scrutiny because of wide-scale implementation and potential non-target effects , particularly on pollinators -LRB-Douglas and Tooker 2015 -RRB- .

NOTTINGHAM, L. *Development and Evaluation of Integrated Approaches for Managing of Mexican Bean Beetle, Epilachna varivestis Mulsant*. Thesis, Virginia Tech, Jan. 2017. <http://hdl.handle.net/10919/74881>

Chapter 5

Gold standard summary: Research starting in 2012 at Virginia Tech’s Kentland Farm began with observation, at all life-stages, of heavy Mexican bean beetle infestation of snap bean plants. The serious problems of the 1960s and 1970s in this regard were reduced for large-scale conventional growers, partly since their farms rarely overlapped with the range of the beetle, but there was severe impact in the Appalachian Mountains in non-chemical small to mid-sized farms, determined by surveying growers across the country. This led to a literature review, screening of cultivars for susceptibility to the beetles, and identification of Dragon’s Tongue as highly susceptible. While in snap beans the pest is relatively easy to control using one or two foliar applications of standard insecticides, and thiamethoxam seed-treatments can benefit growers within the range of the Mexican bean beetle, this beetle still poses a problem for organic growers. It was found that the novel management strategy of reflective plastic mulch was effective in reducing injury. Growing a late-season double-crop like lettuce can leverage the expense of the plastic, and choosing other cultivars like Caprice together with a trap crop like Dragon’s Tongue, can be effective solutions to the beetle problem.

PG: CNN_DailyMail E1: the pest is relatively to control using one or two foliar applications of standard insecticides , which are frequently applied to the crop anyway . the pest is relatively to control using one or two foliar applications of standard insecticides , which are frequently applied to the crop anyway . None

PG: CNN_DailyMail E2: Mexican bean beetle was introduced to Mexican bean beetle at Virginia Tech 's Kentland Farm , in Whitethorne , VA. . he was unaware of the pest 's geographic range or its overall impact on the snap and lima bean industries . the first obstacle was to explore and document the status of the pest geographically and its impact on growers . None

PG: WikiAll E1: Mexican bean beetle -LRB- “ [UNK] [UNK] ” -RRB- , also known as the Mexican bean beetle , is a species of [UNK] beetle in the family [UNK] . It is native to the southeastern United States . It is one of the world 's Mexican bean beetle .

PG: WikiAll E2: Mexican bean beetle -LRB- “ [UNK] [UNK] [UNK] ” -RRB- , also known as Mexican bean beetle , Mexican bean beetle , Mexican bean beetle , Mexican bean beetle , Mexican bean beetle , Mexican bean beetle , and Mexican bean beetle , is a type of Mexican bean beetle . It is native to the United States and Canada , where it is a pest of Mexican bean beetle -LRB- “ Mexican bean beetle ” -RRB- . It is also known as the Mexican bean beetle , the Mexican bean beetle , Mexican bean beetle , Mexican bean beetle , the Mexican bean beetle , Mexican bean beetle , Mexican bean beetle , Mexican bean beetle , Mexican bean beetle , and Mexican bean beetle .

PG: CNN_DailyMail+WikiThesis E1: Mexican bean beetle is a serious threat to organic growers . Mexican bean beetle is a serious threat to organic growers mainly , and that it has Mexican bean beetle . Mexican bean beetle is a serious threat to organic growers mainly , and that it has Mexican bean beetle .

PG: CNN_DailyMail+WikiAll E2: Mexican bean beetle is a pest of Mexican bean beetle . [UNK] bean beetle is a serious threat to organic growers mainly , and that it has been largely ignored in terms of management research due to its low impact in large-scale , commercial production . [UNK] bean beetle is a serious threat to organic growers mainly , and that it has been largely ignored in terms of management research due to its low impact in large-scale , commercial production . [UNK] bean beetle is commonly grown in the fall after beans are harvested , and does well under lower soil temperatures and higher light intensity -LRB- both of which are more likely to use organic or chemical-free management practices .

DARKO, C. B. *Effects of Storage Conditions of Aspergillus Growth and Aflatoxin Production in Peanuts. A Study in Ghana.* Thesis, Virginia Tech, Feb. 2017. <http://hdl.handle.net/10919/75020>

Chapter 1

Gold standard summary: Aflatoxins, which are metabolites of aspergillus species, are major contaminants of staple foods like maize and peanuts in developing areas including Sub-Saharan Africa. The fungi producing aflatoxins are present in the soil. aflatoxins contamination of peanuts is a great global concern due to their carcinogenic effect on humans and livestock, as the intake of aflatoxins is known to cause liver cancer, stunted growth in children and immune system disorders. Cold storage facilities and proper moisture control help controlling the problem in developed nations like the USA. Lack of such an environment in Ghana and most African countries is one the reasons that led this problem to aggravate there. Hermetic storage has been proven to be effective for storing agricultural products. But, its effectiveness for controlling aflatoxin growth in agricultural products has not been established. The key objectives are to: investigate the growth of aspergillus and the production of aflatoxin in shelled peanuts under varying treatment and packaging conditions, determine appropriate pre-storage treatments and packaging, and determine the impact of the switch to hermetic storage on peanut farming and marketing profitability in Ghana.

PG: CNN_DailyMail E1: crops affected include maize -LRB- corn -RRB- and peanuts . The Africa -LRB- Turner Turner et al. , 2005 -RRB- , 100 ppb for dairy animals . The addition to liver have also been linked to stunted growth in children and immune system disorders -LRB- Jolly et al. , aflatoxins . None

PG: CNN_DailyMail+WikiThesis E1: Staple foods in Sub-Saharan Africa and other parts of the developing world are frequently contaminated with baby food as a source of protein , and also used as a source of protein , and also used as bread spread . The costs Africa 750 million annually in the export of cereals , dried fruits and nuts -LRB- Agyei .

PG: CNN_DailyMail+WikiThesis E2: [UNK] contamination of peanuts in African markets is the main dietary staples in many parts of the developing world . The foods in Sub-Saharan Africa and other parts of the developing world are frequently contaminated with aflatoxins , metabolites of *Aspergillus* species , mostly *Aspergillus flavus* and peanuts , which are the main dietary staples in many parts of the world . The fungi grow exponentially in conventional multi-month storage as a result of a combination of these optimum environmental conditions at appropriate moisture content . The technology can also help reduce quality deterioration of foods like peanuts since it is airtight . The technology can generate the modified atmosphere by reducing oxygen and increasing carbon dioxide concentrations through respiratory metabolism . peanuts are packaged in jute or polypropylene woven sacks and stored in cement buildings , wooden or aluminum sheet structures .

PG: CNN_DailyMail+WikiAll E1: [UNK] intake is a type of contamination that occurs in the form of dairy animals . [UNK] foods in Sub-Saharan Africa and other parts of the developing world are frequently contaminated with aflatoxins , metabolites of *Aspergillus* species , mostly *Aspergillus flavus* and *Aspergillus parasiticus* . The main crops affected include maize -LRB- corn -RRB- and peanuts , which are the main dietary staples in many parts of the world .

PG: CNN_DailyMail+WikiAll E2: [UNK] intake is a type of peanut plant that occurs in [UNK] Africa -LRB- [UNK] -RRB- . [UNK] is a type of peanut plant that has been linked to liver cancer , but it has been linked to stunted growth in children and immune system disorders -LRB- Jolly et al. , 2008 -RRB- . [UNK] is also known as the “ [UNK] [UNK] ” and “ [UNK] [UNK] ” . [UNK] is the most common type of dietary staples in the world . [UNK] is the most common type of dietary staples in the world . [UNK] is the most common type of food in the world .

DARKO, C. B. *Effects of Storage Conditions of Aspergillus Growth and Aflatoxin Production in Peanuts. A Study in Ghana.* Thesis, Virginia Tech, Feb. 2017. <http://hdl.handle.net/10919/75020>

Chapter 2

Gold standard summary: Peanuts, which are a leguminous crop, are rich in calories and vital nutrients, vitamins, antioxidants, minerals. They have many health benefits. Being a staple food in Ghana, they are highly important for the region. Cancer-causing aflatoxins are secondary metabolites of some aspergillus fungi. Regulations on aflatoxins have been established, to protect humans and animals from their harmful effects. Aflatoxin-producing fungi need favorable temperature, relative humidity and grain moisture conditions to grow and produce toxins. Aflatoxin production can occur in the field prior to harvest also. Both pre and post-harvest aflatoxin contamination may cause losses of Grains. Post harvest peanut activities are conducive for aflatoxin development. Since storage is an important factor to combat the contamination, various storage solutions have been developed. Some of the storage solutions can pose challenges under Ghanaian conditions Chemical and bio-control can leave residues on peanuts during and after storage. Getting carbon dioxide, nitrogen, and other inert gases to displace oxygen under modified and controlled atmosphere can also be challenging. However, it can meet the goal of finding an appropriate, affordable, and adaptable storage system to help reduce or control aspergillus growth, aflatoxin production, and maintain the quality of peanuts. In addition, packages friendlier to the Ghanaian environment are hermetic storage and active packaging. The type of packaging used for storage can also reduce the rate of lipid oxidation and quality deterioration.

PG: CNN_DailyMail E1: Peanuts are rich in calories and contain many nutrients , vitamins , antioxidants and minerals that are essential for optimum health -LRB- Settaluri . Peanuts also contain high amounts of fats and proteins and , can be used in curbing protein energy malnutrition -LRB- Eshun et al. , 2013 -RRB- . Peanuts are rich in calories and contain many nutrients , vitamins , minerals that are essential for optimum health -LRB- Settaluri . None

PG: CNN_DailyMail E2: Peanuts are rich in calories and contain many nutrients , vitamins , antioxidants and minerals that are essential for optimum health -LRB- Settaluri et al. , 2012 -RRB- . They also contain high amounts of fats and proteins and can be used in curbing protein energy malnutrition -LRB- Eshun et al. , 2013 -RRB- . Peanuts can be consumed raw , boiled , or roasted ; or as peanut oil , peanut butter , energy bars and candies . None

PG: CNN_DailyMail+WikiThesis E2: [UNK] is a leguminous crop that belongs to the family of Fabaceae , and botanically named as *Arachis hypogaea* . Peanuts are rich in calories and contain many nutrients , vitamins , antioxidants and minerals that are essential for optimum health -LRB- Settaluri et al. , 2012 -RRB- . Peanuts are cultivated in all ten regions of Ghana . Peanuts are four major types of aflatoxins , and can be used in curbing protein energy malnutrition -LRB- Eshun et al. , 2013 -RRB- . Peanuts are four major types of aflatoxins , and can be consumed raw , boiled , or roasted ; or as peanut oil , peanut butter , peanut meal in the form of snack foods , energy bars and candies .

PG: CNN_DailyMail+WikiAll E1: [UNK] is a genus of flowering plants in the family [UNK] . [UNK] is a [UNK] crop that belongs to the family of Fabaceae , genus *Arachis* , and botanically named as *Arachis hypogaea* . Peanuts are rich in calories and contain many nutrients , antioxidants and minerals that are essential for optimum health -LRB- . They are rich in calories and contain many nutrients , vitamins , antioxidants and minerals that are essential for optimum health -LRB- .

PG: CNN_DailyMail+WikiAll E2: [UNK] is a genus of viruses in the family [UNK] . [UNK] are commonly referred to as “ [UNK] ” or “ [UNK] [UNK] ” . [UNK] are the most potent naturally occurring carcinogen -LRB- Klich , or liver cancer -RRB- . [UNK] are the most potent naturally occurring carcinogen -LRB- , and this is the third-leading cause of cancer death globally , according to the WHO -LRB- 2008 -RRB- . The is the most major staple crops in most parts of Ghana -LRB- Tsigbey et al. , 2003 -RRB- . The , almost half of the production of peanuts is concentrated in the Northern region of the country . The are used to prepare several indigenous foods and are one of the major staple crops in most parts of Ghana .

DARKO, C. B. *Effects of Storage Conditions of Aspergillus Growth and Aflatoxin Production in Peanuts. A Study in Ghana.* Thesis, Virginia Tech, Feb. 2017. <http://hdl.handle.net/10919/75020>

Chapter 3

Gold standard summary: Studies have shown an escalation of aflatoxigenic fungi growth and aflatoxin production under favorable environmental conditions. Thus, it is important to find storage systems to reduce or eliminate aflatoxin during such conditions. Results indicate that using zero-oxygen hermetic packaging helps suppress aflatoxin production and quality deterioration. Also, partially-roasted-blanch-sorted peanuts show a potential for reducing or eliminating aflatoxin levels during storage. The study has shown that it is best to clean peanuts either by sorting or disinfecting the peanuts before storage. To achieve lower aflatoxin values during storage, it is best to partially roast the peanut samples, blanch them and then sort the bad ones out before storage or processing. Hermetic bags with oxygen absorbers are effective for controlling fungi growth and aflatoxin as well as maintaining quality. Therefore, it is recommended that peanuts be stored hermetically with zero-oxygen in the package.

PG: CNN_DailyMail E1: The primary disease associated with aflatoxin intake is hepatocellular carcinoma -LRB- HCC , or liver cancer -RRB- . this disease is the third leading cause of cancer death globally , according to the World Health Organization 2008 -RRB- . None

PG: CNN_DailyMail E2: The primary disease associated with aflatoxin intake is the third leading cause of cancer death globally . The level of aflatoxin contamination also creates a trade barrier and results in great economic losses to exporters and the region at large . The is a great concern in Sub-Saharan Africa , because peanuts are extensively used in preparing all kinds of dishes , mixed with baby food as a protein source . None

PG: WikiAll E1: [UNK] contamination of peanuts -LRB- aflatoxin intake -RRB- is a type of hepatocellular carcinoma disease characterized by the presence of [UNK] and [UNK] -LRB- [UNK] -RRB- contamination of peanuts and peanut-based products . It is one of the most commonly used in Sub-Saharan Africa . It is one of the world 's largest [UNK] in the world . It is a member of the [UNK] family of [UNK] .

PG: WikiAll E2: Peanut intake is a type of [UNK] disease characterized by the presence of peanuts and peanut-based products . It is a type of [UNK] disease . It is a type of [UNK] disease . It is a type of [UNK] disease . It is a type of [UNK] disease . It is a type of [UNK] disease . It is also known as “ [UNK] [UNK] ” or “ [UNK] [UNK] ” . It is a type of [UNK] , a type of [UNK] . It is also known as “ [UNK] peanuts ” .

PG: CNN_DailyMail+WikiThesis E1: [UNK] intake is hepatocellular carcinoma -LRB- HCC , or liver cancer -RRB- . The primary disease is the third leading cause of cancer death globally . The primary disease is the third leading cause of cancer death globally . The primary disease is the third leading cause of cancer death globally .

PG: CNN_DailyMail+WikiThesis E2: [UNK] contamination of peanuts and peanut-based products is the third leading cause of cancer death globally , according to the World Health Organization -LRB- 2008 -RRB- . The level of aflatoxin contamination also creates a trade barrier and results in great economic losses to exporters and the region at large . The loss on the peanut value chain is quality loss during storage , due to lipid oxidation and rodent damage result in the proliferation and spread of fungal spores . The loss on the peanut value chain is the third leading cause of cancer death globally . peanuts are extensively used in preparing all kinds of dishes , mixed with baby food as a protein source , and used as bread spread .

PG: CNN_DailyMail+WikiAll E1: [UNK] contamination of peanuts -LRB- aflatoxin -RRB- is a type of contamination that occurs in the form of peanuts and immune system disorders . [UNK] contamination of peanuts and peanut-based products is of great concern globally due to its carcinogenic effect on humans and livestock -LRB- . The addition to liver cancer , aflatoxins have been linked to its carcinogenic effect on humans and livestock -LRB- .

PG: CNN_DailyMail+WikiAll E2: [UNK] intake is a type of contamination that occurs during post-harvest growth and aflatoxin development ranges from 26.7-43.3 °C , with a relative humidity of 62 – 99 , and moisture content of 13-20 -LRB- Sumner Lee , 2012 -RRB- . The is the third leading cause of cancer death globally , according to the World Health Organization -LRB- 2008 -RRB- . [UNK] primary disease associated with aflatoxin intake is hepatocellular carcinoma -LRB- HCC , or liver cancer -RRB- and this disease is the third leading cause of cancer death globally , according to the World Health Organization -LRB- 2008 -RRB- . The primary disease associated with aflatoxin and peanut-based products is of great concern globally due to its carcinogenic effect on humans and livestock -LRB- Amaditor .

DARKO, C. B. *Effects of Storage Conditions of Aspergillus Growth and Aflatoxin Production in Peanuts. A Study in Ghana.* Thesis, Virginia Tech, Feb. 2017. <http://hdl.handle.net/10919/75020>

Chapter 4

Gold standard summary: Peanuts are used in most developing countries to prevent malnutrition, due to their high protein content. In most developing countries peanuts are infested with fungi, especially *Aspergillus* that produce aflatoxin. The effect of pre-storage treatments and packaging to control aflatoxin production and quality degradation during storage was studied. Partially roasting and blanching peanuts can increase the effectiveness of sorting, and hence aid in reducing aflatoxin along the peanut value-chain. Also, hermetically storing peanuts can suppress the growth of aflatoxigenic fungi and the production of aflatoxin under tropical ambient conditions. Raw clean peanuts can best maintain quality during storage but might still have high aflatoxin levels. Sorting could be a very good method for reducing aflatoxin levels before and during storage. However, hand-sorting consumes time and adds additional preparation cost. Partially roasting, and blanching peanuts, can kill the aflatoxigenic fungi and halt aflatoxin production during storage, and also increase the effectiveness of peanut sorting; thus aiding in reducing or eliminating aflatoxin levels along the peanut value chain. To have low levels of aflatoxin before, during, and after storage, as well as to maintain peanut quality, it would be best to partially roast peanuts, blanch them, sort out the infested and discolored ones, and then hermetically store the resulting set.

PG: CNN_DailyMail E1: Peanut are rich in calories and contain many nutrients , vitamins , antioxidants and minerals that are essential for maintaining optimum health -LRB-Settaluri . Peanuts are rich in calories and contain many nutrients , vitamins , antioxidants and minerals that are essential for maintaining optimum health -LRB- Settaluri .
None

PG: CNN_DailyMail E2: Peanut are rich in calories and contain many nutrients , vitamins , antioxidants and minerals that are essential for maintaining optimum health -LRB-Settaluri , et al , 2012 -RRB- . Peanuts also contain a high amount of fats and proteins .
None

PG: WikiAll E1: Peanut contamination of peanuts is a type of leguminous crop . It is one of the world 's most widely used in Sub-Saharan Africa . It is a member of the family of Fabaceae -LRB- [UNK] -RRB- , which is a member of the genus " Fabaceae " .

PG: WikiAll E2: Peanut is a [UNK] crop that belongs to the family of Fabaceae fungi . It is a type of [UNK] crop that has been found to grow exponentially in conventional storage for a longer duration as a result of prevalent heat and high humidity -LRB- Hell et al. , 2010 -RRB- . Peanuts losses of major staple crops -LRB- maize and peanuts -RRB- in Ghana and other countries in Sub-Saharan Africa and most parts of Sub-Saharan Africa and most parts of Ghana and other countries in Ghana and other countries of Ghana , it is a major cause of food quality deterioration and generation of agricultural products .

PG: CNN_DailyMail+WikiThesis E1: Peanut is a leguminous crop that belongs to the family of Fabaceae , and botanically named *Arachis hypogaea* . Peanuts are rich in calories and contain many nutrients , vitamins , antioxidants and minerals that are essential for maintaining optimum health -LRB- .

PG: CNN_DailyMail+WikiThesis E2: [UNK] is a leguminous crop that belongs to the family of Fabaceae , and botanically named *Arachis hypogaea* . Peanuts are rich in calories and contain many nutrients , vitamins , antioxidants and minerals that are essential for maintaining optimum health -LRB- Settaluri , et al , 2012 -RRB- . Peanuts contamination of foods has been found to increase in storage . Aflatoxin contamination of peanuts is a worldwide problem and , in addition to its effect on food safety . Aflatoxin fungi mostly *Aspergillus flavus* and *Aspergillus parasiticus* which metabolize to produce aflatoxins . Aflatoxin fungi grow exponentially in conventional storage for a longer duration as a result of prevalent heat and high humidity -LRB- .

PG: CNN_DailyMail+WikiAll E1: Peanut is a [UNK] crop that belongs to the family of Fabaceae , genus *Arachis* , and botanically named *Arachis hypogaea* . Peanuts are rich in calories and contain many nutrients , antioxidants and minerals that are essential for maintaining optimum health -LRB- . Peanuts are rich in calories and contain many nutrients , antioxidants and minerals that are essential for maintaining optimum health -LRB- . Peanuts are rich in calories and contain many nutrients , vitamins , antioxidants and minerals that are essential for maintaining optimum health -LRB-

PG: CNN_DailyMail+WikiAll E2: Peanut is a leguminous crop that belongs to the family of Fabaceae , and botanically named *Arachis hypogaea* . Peanuts is a leguminous crop that belongs to the family of Fabaceae , genus *Arachis* , and botanically named *Arachis hypogaea* . Peanuts is a worldwide problem and , in addition to its effect on food safety , the economic losses are significant -LRB- Dorner , et al , 2012 -RRB- . Peanuts contamination of foods has been found to increase in storage . [UNK] contamination of peanuts is a worldwide problem . Aflatoxin contamination of peanuts is a worldwide problem .

DARKO, C. B. *Effects of Storage Conditions of Aspergillus Growth and Aflatoxin Production in Peanuts. A Study in Ghana.* Thesis, Virginia Tech, Feb. 2017. <http://hdl.handle.net/10919/75020>

Chapter 5

Gold standard summary: In Ghana and in other countries Sub-Saharan Africa, aflatoxin fungi infestation causes the post-harvest loss in peanuts. Since polypropylene woven sacks are not airtight, peanuts stored in them are susceptible to fungal and aflatoxin contamination. Studies have shown that hermetic packs can be used effectively to suppress fungi growth, aflatoxin production and quality deterioration in stored peanuts. As the peanut business in Ghana is generally profitable, farmers and traders stand to make additional revenue and profits from switching from traditional packaging to hermetic storage. The study aims to determine if the new hermetic storage technology is more profitable than existing storage methods, before recommending it for peanut farmers and traders. While the new storage technology improves the farmer and trader profitability, it has the potential to reduce the incidence of various ailments that have been attributed to aflatoxins. Hence, the local production and marketing of a hermetic storage system should be encouraged, along with the active creation of awareness of their benefits in reducing the incidence of aflatoxins. In considering the significant national economic impacts of aflatoxins, peanut farmers and traders could be assisted through various financing schemes to acquire the new technology.

PG: CNN_DailyMail E1: Postharvest losses could adequately meet the minimum annual food requirements of 48 million people -LRB- World Bank . In the undernourished , about 780 million people , are in developing regions and about 780 million people , are in developing regions and about 239 . None

PG: CNN_DailyMail E2: about 795 million people remain undernourished globally . These losses could adequately meet the minimum annual food requirements of 48 million people -LRB- World Bank , 2011 -RRB- . Peanuts contain a high amount of fats and proteins , and can be used in curbing protein and energy malnutrition because they contain all the essential amino acids needed for normal body growth . None

PG: WikiAll E1: Aflatoxin is a genus of [UNK] fungi in the phylum [UNK] . It is a member of the genus “ [UNK] ” in the genus “ [UNK] ” . It is a member of the genus “ [UNK] ” in the genus “ [UNK] ” .

PG: CNN_DailyMail+WikiThesis E1: about 795 million people are in developing regions and about 239 million are in developing regions and about 239 million are in developing regions and about 239 million are in developing regions and about 239 million are in developing regions and about 239 million are in developing regions and about 239 million people remain undernourished globally .

PG: CNN_DailyMail+WikiThesis E2: [UNK] is a type of food produced for human consumption is lost globally . about 795 million people are in developing regions and about 239 million are in Sub-Saharan Africa -LRB- FAO , 2011 -RRB- . These losses could adequately meet the minimum annual food requirements of 48 million people -LRB- World Bank , 2011 -RRB- . These losses could adequately meet the minimum annual food requirements of 48 million people -LRB- World Bank , 2011 -RRB- . These losses could adequately meet the minimum annual food requirements of 48 million people -LRB- World Bank , 2011 -RRB- . These losses could adequately meet the minimum annual food requirements of 48 million people in 2010 was about 1.3 billion tons per year -LRB- Gustafson et al. , 2011 -RRB- .

PG: CNN_DailyMail+WikiAll E1: [UNK] is a list of fungi in the state of Sub-Saharan Africa . [UNK] is the largest staple of the population of human consumption in the [UNK] [UNK] . [UNK] is the largest number of fungi in the world . [UNK] is the largest number of fungi in the world .

PG: CNN_DailyMail+WikiThesis E2: [UNK] contamination of peanuts and peanut-based handling causes high aflatoxin levels and it is worse during storage . This contamination is a problem in Ghana because the storage system and environmental conditions -LRB- temperature and humidity -RRB- supports aflatoxin production . This study made a number of key findings which have implications for reducing aflatoxins on the peanut value chain , for agricultural innovation extension , storage management , and postharvest policy development in this region . This levels for partially roasted samples were minimal compared to raw of the same samples stored in hermetic packages were second in maintaining quality deterioration .

PG: CNN_DailyMail+WikiAll E1: [UNK] intake is a type of storage system that is used to measure the growth of peanuts and immune system disorders . [UNK] contamination of peanuts and peanut-based products has been of great concern globally due to their carcinogenic effect on humans and livestock . Aflatoxin contamination is a problem in Ghana , because peanuts are extensively used in preparing all kinds of dishes , and are mixed with baby food as a source of protein .

PG: CNN_DailyMail+WikiAll E2: [UNK] intake is a type of peanut storage system used to reduce aflatoxin levels . [UNK] contamination is a problem in Ghana because the storage system and environmental conditions -LRB- temperature and humidity -RRB- creates a trade barrier and results in great economic losses to exporters and the country at large . This of the ailments associated with aflatoxin intake is hepatocellular carcinoma -LRB- HCC , or liver cancer -RRB- , linked to stunted growth in children and immune system disorders . This is of great concern in Ghana , because peanuts are extensively used in preparing all kinds of dishes , and are mixed with baby food as a source of protein .

PENT, G. *Lamb performance, behavior, and body temperatures in hardwood silvopasture systems*. Thesis, Virginia Tech, Mar. 2017. <http://hdl.handle.net/10919/76730>

Chapter 1

Gold standard summary: Silvopasture, one of five agroforestry practices, integrates trees with pasture-based livestock systems, improving soil conservation and nutrient utilization, with ecosystem, environmental, and production advantages. Livestock can benefit from shade in summer and shelter in winter, while trees benefit from weed suppression and nutrient cycling. More study is needed of animal well-being, behavior, and productivity in silvopastures, especially considering the effect of shade, a potential means for alleviating the effects of hot ambient conditions, that leads to more time grazing and less time standing. Key issues are animal and forage production in silvopastures, ruminant response to heat stress (measured with various indexes and causing problems including reduced dry matter intake, which reduces animal productivity) in extensive conditions, and the effect of shade in mitigating livestock heat stress (indicated by lower mean vaginal temperatures).

PG: CNN_DailyMail E1: Literature offers opportunity to fulfill the demands both for increasing food and fiber production are managed so as to take advantage of positive interactions among system components . These diversified systems can benefit from shade in summer and shelter from wind in winter . Trees , one of five agroforestry practices , integrates trees with pasture-based livestock systems and provides both short - and long-term returns . None

PG: CNN_DailyMail E2: Literature Review Introduction population growth is increasing global demands for food and fiber production at the same time that the agricultural landbase and the resources for agricultural production are in decline -LRB- Pimentel et al. , 1976 ; Tilman et al. , 2011 -RRB- . Agroforestry , the sustainability of such reductionist methods is being called into question -LRB- Lyson , 2002 -RRB- and systems that take advantage of complexity and diversity are being seen as more productive and sustainable . Silvopasture in silvopasture systems can benefit from shade in summer and shelter from wind in winter . None

PG: WikiAll E1: [UNK] is a population of agricultural and fiber production systems in the United States and Canada . It is one of the world 's largest agricultural networks in the world . It is one of the world 's leading experts in the fields of food and fiber production systems .

Gold standard summary: Lamp productivity in hardwood silvopastures has key factors including forage productivity, nutritive value, and species composition. Forage response and lamb performance within hardwood silvopasture systems are compared to open pastures. The honeylocust silvopasture supported the same stocking rate as the open pastures, but the black walnut silvopastures, with lower forage availability, supported fewer animals for 2014-2016 at Virginia Tech’s Kentland Farm, where 50-70 sheep were involved each year, and measurements were made of temperature, forage, and weight gains. Both of the cases support equivalent lamb live weight gains compared to conventional open pastures.

PG: CNN_DailyMail E1: black walnut - and honeylocust-based silvopasture systems were compared with open pastures in a randomized complete block design with three blocks over three summers . Pre-graze were rotationally stocked with 5 to 7 crossbred lambs depending on . availability . None

PG: CNN_DailyMail E2: black walnut were rotationally stocked with 5 to 7 crossbred lambs depending on forage availability . Pastures were rotationally stocked with 5 to 7 crossbred lambs depending on forage availability . Pastures percent cover was estimated using a modified Daubenmire approach at the same twelve points within each experimental unit every four weeks during the study . None

PG: WikiAll E1: The black walnut -LRB- “ [UNK] [UNK] ” -RRB- , also known as the black walnut , is a walnut in the walnut family , [UNK] . It is a member of the walnut family , [UNK] , and is a member of the family [UNK] . It is a member of the walnut family , [UNK] .

PG: WikiAll E2: The Virginia Tech Institutional Animal Care and Use Committee under the Virginia Tech Institutional Animal Care and Use Committee -LRB- [UNK] -RRB- is a nonprofit organization based in [UNK] , Virginia that focuses on trees and livestock systems . It is a part of the Virginia Tech Department of Natural Resources -LRB- [UNK] -RRB- . The Virginia Tech Institutional Animal Care and Use Committee -LRB- [UNK] et al. , 2013 -RRB- was conducted by the Virginia Tech ’s Kentland Farm in Blacksburg , Virginia -LRB- 37.20 et al. , 2006 -RRB- . The work was approved by the Virginia Tech Institutional Animal Care and Use Committee -LRB- [UNK] et al. , 2006 -RRB- .

PG: CNN_DailyMail+WikiThesis E1: [UNK] productivity , nutritive value , and species composition in hardwood silvopastures can have variable effects on forage and animal growth . Species studies have indicated that animal gains are similar or better despite lower forage yield .

PG: CNN_DailyMail+WikiThesis E2: [UNK] is a species of livestock producers , including [UNK] , [UNK] and [UNK] . [UNK] systems are used to [UNK] trees and livestock systems . [UNK] trees in turn benefit from the managed livestock presence through amplified nutrient cycling and suppression of weedy or invasive species . silvopasture resource competition between forages and trees , the decrease in forage quantity might be ameliorated by an increase in forage nutritive value , whether that animal gains are similar or better despite lower forage yield . Forage percent cover was estimated using a modified Daubenmire approach at the same twelve points within each experimental unit every four weeks during the study .

PG: CNN_DailyMail+WikiAll E1: [UNK] black walnut silvopastures “ [UNK] [UNK] ” -RRB- is a type of black walnut in the family [UNK] . [UNK] is a member of the black walnut family . [UNK] was first described by [UNK] [UNK] and [UNK] [UNK] .

PG: CNN_DailyMail+WikiThesis E2: [UNK] is a type of animal performance in the order of [UNK] trees and [UNK] trees . [UNK] recordings were approved by the Virginia Tech Institutional Animal Care , which recorded WAV files at a 16-bit resolution and 48-kHz sampling rate , and a Sennheiser ME-2 recorder -LRB- . -LRB- the recorder , the microphone cord ran through 6-mm plastic tubing to a nylon adjustable Goat Halter -LRB- Class Class , which recorded each bite event with a start and stop time stamp , along with the voltage of the signal . The recordings were reduced to monaural recordings and processed with a high-pass frequency filter -LRB- 600-Hz , 4800-dB -RRB- , CA -RRB- , CA -RRB- , CA -RRB- , CA -RRB- , CA -RRB- , CA -RRB- and CA -RRB- .

PG: CNN_DailyMail+WikiAll E1: [UNK] deciduous silvopastures , also known as the deciduous silvopastures , is a type of animal in the family [UNK] . [UNK] was developed by [UNK] [UNK] and [UNK] [UNK] . [UNK] was developed by [UNK] [UNK] and [UNK] [UNK] . [UNK] was developed by [UNK] [UNK] and [UNK] [UNK] . [UNK] was developed by [UNK] [UNK] and [UNK] [UNK] . [UNK] was developed by [UNK] [UNK] and [UNK] [UNK] . [UNK] was developed by [UNK] [UNK] and [UNK] [UNK] . [UNK] was developed by [UNK] [UNK] and [UNK] [UNK] .

PG: WikiAll E2: The Virginia Tech Institutional Animal Care and Use Committee -LRB- THI -RRB- is one of the world 's leading experts in the field of animal productivity . It is one of the world 's leading experts in the field of animal productivity , and has been one of the world 's leading experts in the field of animal productivity . The Virginia Tech Institutional Animal Care and Use Committee under the Virginia Tech Institutional Animal Care and Use Committee under the Virginia Tech Institutional Animal Care and Use Committee -LRB- [UNK] et al. , 2001 -RRB- , was approved by the Virginia Tech Institutional Animal Care and Use Committee -LRB- 1966 -RRB- .

PG: CNN_DailyMail+WikiThesis E1: [UNK] lamb vaginal temperatures in hardwood silvopastures produce equivalent to open pastures -LRB- et al. , 2000 -RRB- . The produce equivalent animal output compared to open pastures -LRB- Peri et al. , 2001 . The is bounded by lower and upper critical temperatures points .

PG: CNN_DailyMail+WikiThesis E2: [UNK] is a type of tree species in the genus “ [UNK] ” . [UNK] is a result of the heat stress on the animal 's capacity to reduce internal heat load through reduced metabolism or if the temperature increase was too sudden for the animal to adapt by reducing DMI , the body temperature of the animal increases . The temperatures continue to rise past the animal 's capacity to reduce internal heat load through reduced cattle heat loads -LRB- Ittner et al. , 1955 -RRB- . The temperatures continue to rise past the animal 's capacity to reduce heat loads .

PG: CNN_DailyMail+WikiAll E1: [UNK] lamb vaginal temperatures in hardwood silvopastures Introduction Silvopastures is one of the three main types of vaginal temperatures in hardwood silvopastures Introduction Silvopastures . [UNK] have a capacity for compensatory gains after periods of heat stress and low growth rates -LRB- Morrison et al. , 2001 -RRB- . The addition , the capacity for measuring weight gain changes is often limited by the negative effects of that stress on the animal may not be noticed solely through a limited analysis of live weight gains .

PG: CNN_DailyMail+WikiAll E2: [UNK] is a branch of medicine that deals with the development of livestock and livestock . [UNK] is a part of the field of animal health , and is the study of heat stress , heat stress , heat stress , heat stress , heat stress , heat stress , heat stress , heat stress , heat stress , heat stress , and body temperature . [UNK] is also known as the “ [UNK] [UNK] ” , a [UNK] of the [UNK] [UNK] [UNK] [UNK] [UNK] -RRB- , the [UNK] [UNK] [UNK] [UNK] [UNK] -RRB- , and the [UNK] [UNK] [UNK] [UNK] [UNK] -RRB- .

Gold standard summary: The study shows that animal welfare may be improved through the provision of shade. Losses in forage productivity in the black walnut silvopastures were not tied to losses in animal productivity. The benefits to animal comfort provided by the trees in these silvopastures likely compensated for any changes in forage characteristics. Nevertheless, even with the potential products and ecosystem services rendered by the trees in these silvopastures, these systems had similar animal output compared to the conventional open pastures during the summer months and during one winter study; longer term studies seem warranted to extend our understanding.

PG: CNN_DailyMail E1: animal of shown the positive have shown the positive impact of shade on animal productivity in intensive , confinement operations , the necessity of shade in extensive , pasture situations is not well understood . Necessity of shade for livestock should not be defined merely by apparent productivity as heat may negatively affect animal comfort and behavior . In in silvopastures were found to actively follow and utilize shade from the trees . None

PG: CNN_DailyMail E2: black walnut silvopastures spent more than two hours longer each day standing up compared to lambs in the silvopastures , indicating 142 the level of discomfort experienced by lambs without shade . Lambs in the open pastures spent slightly more time grazing than lambs in the other systems as measured from the time lapse imagery . Lambs is likely that the increased heat tolerance of these sheep blurred the distinction in grazing behavior between lambs in the honeylocust silvopastures and the open pastures . None

PG: WikiAll E1: The black walnut silvopasture -LRB- “ [UNK] [UNK] ” -RRB- , also known as the black walnut silvopasture , is a species of walnut in the family [UNK] . It is native to the western United States , where it is considered to be one of the largest trees in the walnut family .

PG: WikiAll E2: A hair sheep breed -LRB- [UNK] -RRB- is a type of [UNK] tree that has been used as a synonym for [UNK] trees . It is also known as “ [UNK] [UNK] ” or “ [UNK] [UNK] ” . It is also known as “ [UNK] [UNK] ” or “ [UNK] [UNK] ” . It is also known as “ [UNK] [UNK] ” or “ [UNK] [UNK] ” . It is also known as “ [UNK] [UNK] ” or “ [UNK] [UNK] ” . It is native to North America , where it is widely used in Europe and Australia .

PG: CNN_DailyMail+WikiThesis E1: [UNK] of shade for livestock should not be defined merely by apparent productivity as heat may negatively affect animal comfort and behavior prior to any noticeable decline in productivity . In is not clear whether this is due to forage productivity and nutrition -LRB- and lower NDF concentrations -RRB- .

PG: CNN_DailyMail+WikiThesis E2: black walnut and honeylocust silvopastures systems supported equivalent lamb live weight gains compared to the treeless pastures during one winter study . The in the silvopastures silvopastures had similar vaginal temperatures , and in one month hotter peak temperatures -LRB- August -RRB- , than lambs in the open pastures . The in the silvopastures silvopastures spent more than two hours longer each day standing up compared to lambs in the final year . the lambs in the open pastures spent more time lying down than lambs in the open pastures . In in the open pastures spent more time grazing than lambs in the other systems .

PG: CNN_DailyMail+WikiAll E1: [UNK] black walnut silvopastures “ [UNK] [UNK] ” -RRB- is a black walnut that was first described by [UNK] [UNK] and [UNK] [UNK] . [UNK] was developed by [UNK] [UNK] [UNK] and [UNK] [UNK] [UNK] [UNK] in the [UNK] [UNK] [UNK] . [UNK] was developed by [UNK] [UNK] [UNK] and [UNK] [UNK] [UNK] [UNK] . [UNK] the [UNK] [UNK] , the black walnut and honeylocust silvopastures addition to the black walnut silvopastures spent more than two hours longer each day standing up compared to lambs in the black walnut silvopastures .

PG: CNN_DailyMail+WikiAll E2: [UNK] physiology , the black walnut silvopasture is a form of animal physiology that occurs in the black walnut silvopastures in the black walnut silvopastures . [UNK] , the term “ black walnut silvopasture ” refers to the impact of the black walnut 143 in the black walnut silvopastures . [UNK] is also known as the black walnut silvopastures , which is also known as the black walnut silvopastures . [UNK] , the term “ black walnut ” refers to the fact that the black walnut silvopastures , which is known as the black walnut silvopastures , can be found in the black walnut silvopastures in the open pastures .

STITH, K. M. *A Mixed Methods Study on Evaluations of Virginia’s STEM-Focused Governor’s Schools*. Thesis, Virginia Tech, Mar. 2017. <http://hdl.handle.net/10919/76735>

Chapter 1

Gold standard summary: Despite decades of continuous reform, American students lag behind their international counterparts in STEM proficiencies and lack interest in pursuing related careers. With the shift of US economy from an industrial to a post-industrial economy, additional requirements for general skills has emerged including learning, reasoning, communicating, general problem-solving skills, and behavioral skills. Several underlying theories and models are situated within best practices as identified through scholarly literature and recommended the NAGC. These practices are also supported by the evaluation instrument used by the VDOE. Learning and development, assessment, curriculum planning and instruction, learning environments, programming, and professional development are individual keystones, yet build a supportive bridge between gifted program inputs and program goals.

PG: CNN_DailyMail E1: movements knowing 's support of the last century have been spread with a claims to emerged . movements knowing 's news have been augmented on for more than a firefighters role . movements knowing 's news -lrb- be [UNK] in the first incident of the world updated . None

PG: CNN_DailyMail E2: Introduction The United ' educational system has experienced several driving movements over the last century in large part due to economic and political situations of the respective time periods . American students lag behind international counterparts in science , technology , engineering , and mathematic -LRB- -RRB- proficiencies . There is little agreement amongst scholars as to what defines a STEM-literate individual -LRB- Zollman , 2012 -RRB- . None

PG: WikiAll E1: The United States ' educational system is a branch of the United States government that focuses on the economic and political situations of the United States . The United States ' educational system consists of a range of driving movements over the last century in the United States . The United States ' educational system consists of a range of driving movements over the last century in the United States .

PG: WikiAll E2: The United States ' educational system is a part of the United States Department of Education -LRB- [UNK] -RRB- . It is one of the world 's leading experts in the field of gifted education . It is one of the world 's leading experts in the field of gifted education . It is one of the world 's leading experts in the field of gifted education , and is one of the world 's leading experts in the field of gifted education . It is a member of the National Research Center -LRB- [UNK] -RRB- , and is one of the world 's leading experts in the field of gifted education .

STITH, K. M. *A Mixed Methods Study on Evaluations of Virginia's STEM-Focused Governor's Schools*. Thesis, Virginia Tech, Mar. 2017. <http://hdl.handle.net/10919/76735>

Chapter 2

Gold standard summary: A national problem of preparing students for a contemporary society, widely recognized through landmark reports in the 1980's, was confirmed to still exist within the educational system of the United States. Evidence was provided to show that a deficit of STEM literacy has led to a widening gap between scientific and technological developers and average citizens, a threat to global competitiveness, and inability to maintain a future STEM-capable workforce. Though a natural resource of future leaders and innovators, gifted students are often largely ignored in all-inclusive classrooms; the No Child Left Behind initiative has been particularly detrimental to the gifted student population. To maximize the learning experiences of these gifted students, accelerated and differentiated programs that focus on STEM disciplines have been recognized as a viable solution for the national problem. Though ranging in various frameworks, these programs have a higher rate of students graduating with STEM degrees compared to the national average. The Virginia Governor's Schools provide gifted services, through academic and visual and performing arts opportunities, to approximately 6,500 students in Virginia with many schools promoting a STEM-focused curriculum; 17 of the 19 Academic-Year Governor's Schools have a STEM focus. The evaluation procedures of these programs were recognized to play an important role in providing evidence to the effectiveness of these programs, thus leading to one solution to the national problem.

PG: CNN_DailyMail E1: The second section discusses the national problem of cultivating a STEM-capable citizenry and how slow-moving educational reform initiatives risk the United States' ability to maintain global competitiveness. The 1 is an overview of the concepts that shaped this study, illustrating where this study would fit into the current body of literature and its role within STEM reform movements for gifted populations. None

PG: CNN_DailyMail E2: This review is divided into three major sections . The first section discusses the national problem of cultivating a STEM-capable citizenry and how slow-moving educational reform initiatives risk the United States ' ability to maintain global competitiveness . The second section reviews the body of knowledge regarding gifted education and the concept that gifted students are a source of our future scientific and technological innovators . the study would fit into the current body of literature and its role within STEM reform movements for gifted populations . None

PG: WikiAll E1: The STEM-focused Virginia Governor 's School -LRB- Addressed -RRB- is one of the largest public colleges in the U.S. state of Virginia . It is a member of the Virginia Governor 's Colleges and Universities -LRB- [UNK] -RRB- . The United States Department of Education -LRB- [UNK] -RRB- is a part of the Virginia Department of Education .

PG: WikiAll E2: The United States Department of Education -LRB- PCAST -RRB- is a United States Department of Education -LRB- [UNK] -RRB- that was established in 2001 as the National Research Council 's National Science Board -LRB- NSB -RRB- . The United States Department of Education -LRB- [UNK] -RRB- is a part of the United States Department of Education -LRB- PCAST -RRB- . The National Science Foundation -LRB- [UNK] -RRB- is a part of the United States Department of Education -LRB- PCAST -RRB- . The National Science Foundation -LRB- [UNK] -RRB- is a part of the United States Department of Education -LRB- [UNK] -RRB- . The National Research Council -LRB- [UNK] -RRB- is a part of the United States Department of Education -LRB- [UNK] -RRB- .

PG: CNN_DailyMail+WikiThesis E1: [UNK] review is divided into three major sections . The review is divided into three major sections . The review is divided into three major sections . The review is divided into three major sections .

PG: CNN_DailyMail+WikiThesis E2: [UNK] is a landmark report by American President Ronald Reagan 's National Commission on Excellence in 2001 . The academic year , fewer than 16 of US students pursue STEM disciplines at a university level compared to 59 of Chinese students and 66 of Japanese students . The students who are highly qualified to pursue STEM careers simply do not due to negative postsecondary experience , high tuition , challenging curricula , low-paying job prognosis , and creating a deficit of STEM-capable workers -LRB- NSB , 2014 -RRB- . The review is divided into three major sections . The second section discusses the national problem of cultivating a STEM-capable citizenry and how slow-moving educational reform initiatives risk the United States ' ability to maintain global competitiveness .

PG: CNN_DailyMail+WikiAll E1: [UNK] Virginia To 's School Programs is one of the [UNK] of the [UNK] [UNK] of the [UNK] [UNK] of the [UNK] [UNK] of the [UNK] [UNK] of the [UNK] [UNK] of the [UNK] [UNK] of [UNK] .

STITH, K. M. *A Mixed Methods Study on Evaluations of Virginia's STEM-Focused Governor's Schools*. Thesis, Virginia Tech, Mar. 2017. <http://hdl.handle.net/10919/76735>

Chapter 3

Gold standard summary: A convergent mixed methods design was used to explore multiple sets of data retrieved from the evaluations of five STEM-focused Annual-Year Governor's Schools (AYGS) schools. Descriptive and content analyses were completed to inform Research Questions 1 (on collective proficiency levels) and 2 (on emergent theses and recommendations). Evaluators were recruited to participate in the study and interviewed on their interpretations of best practices for AYGS program standards, thus informing research question 3 (on interpretations of evaluators) and six sub-research questions (on how evaluators recognize various types of best practices). Strategies embedded within the study were designed to establish truthfulness, credibility, dependability, and transferability into the study. A pilot study, carried out with one evaluator, aimed to ensure the clarity of the 50 semi-structured interview questions. The analysis included descriptive, content, and thematic aspects. The researcher, a high school science teacher in a Virginia Governor's school for the last five years, holding a proactive stance intending to promote the Virginia Governor's Schools, hence chose evaluation to obtain sound evidence.

PG: CNN_DailyMail E1: instrument 's backward mapping was designed so that evaluation so that evaluation designers may be well-informed when determining instrument efficacy . Research backward mapping was designed so that evaluation so that evaluation designers may be well-informed when determining instrument efficacy . Research are the interpretations of evaluators on the desired outcomes of the 2014 Governor 's School Full-Site standards ? None

PG: CNN_DailyMail E2: the study was to collect consequential evidence of an untested rubric instrument used for the evaluations . identify the current findings , commendations and recommendations among the schools , highlight emerging trends , and compare the interpretations of evaluators in their operational definitions of the evaluation metric standards . How do evaluators recognize best practices in curriculum planning instruction ? None

STITH, K. M. *A Mixed Methods Study on Evaluations of Virginia's STEM-Focused Governor's Schools*. Thesis, Virginia Tech, Mar. 2017. <http://hdl.handle.net/10919/76735>

Chapter 4

Gold standard summary: The primary purpose of the study was to collect consequential evidence surrounding an untested rubric used during the evaluations of five STEM-focused Virginia Governor's Schools. Quantitative findings were presented in the form of descriptive statistics to address Research Question 1, while the qualitative findings were presented in the form of categories and conclusions to address Research Question 2 and Research Question 3. The descriptive analysis revealed that the collective proficiency levels of the AYGS programs were rated as Doesn't meet standard (n= 19, 6.10), Meets standard (n= 248, 80), and Exceeds standard (n= 43, 13.87) for the 62 standards in the 2014 Governor's School Full- Site Evaluation rubric. The content analysis revealed the six emergent themes from the findings, commendations, and recommendations of the evaluation reports: (a) supported faculty are a catalyst for program achievement; (b) instructional technology is important for STEM education; (c) stakeholder engagement is fundamental to program success and improvement; (d) out of the classroom and into the world; (e) culture of accomplishment in the classroom; and (f) opportunities exist for the educational leadership. The thematic analysis uncovered that evaluators envision the "best practices" for gifted students similarly, but personal experiences and pedagogical philosophies lead to more critical evaluation of some standards over others. Evaluators had an overall positive impressions on the evaluation procedures.

PG: CNN_DailyMail E1: CHAPTER Year 's Schools -LRB- -RRB- was untested rubric instrument . Chapter are the interpretations of evaluators on the desired outcomes of the 2014 Governor 's School Full-Site rubric standards ? SQa . How are the interpretations of evaluators on the desired outcomes of the 2014 Governor 's School Full-Site rubric standards ? None

PG: CNN_DailyMail E2: the study was intended to assist evaluation designers in determining rubric efficacy . This study implemented a convergent mixed methods design with data from the AYGS programs ' final evaluation reports and evaluator interviews . The do evaluators recognize best practices in curriculum planning instruction ? None

PG: WikiAll E1: The Virginia Governor 's Schools -LRB- AYGS -RRB- is a United States Department of State 's Schools . It is a part of the Virginia Governor 's Schools -LRB- AYGS -RRB- . It is a part of the Virginia Governor 's Schools -LRB- [UNK] -RRB- .

PG: WikiAll E2: The Virginia Governor 's School Full-Site Evaluation rubric -LRB- rubric -RRB- is a research study conducted by the Governor of Virginia in the United States and Canada . It was established in 2014 by the Governor of Virginia in the wake of the 2014 Governor 's School Full-Site Evaluation rubric . The study was funded by the 2014 Governor 's School Full-Site Evaluation rubric -LRB- rubric -RRB- . The study was funded by the 2014 Governor 's School Full-Site Evaluation rubric -LRB- rubric -RRB- . The study was funded by the 2014 Governor 's School Full-Site Evaluation rubric -LRB- [UNK] -RRB- .

PG: CNN_DailyMail+WikiThesis E1: [UNK] do evaluators recognize best practices for learning and development ? How do evaluators recognize best practices of learning and development ? How do evaluators recognize best practices of assessment ? How do evaluators recognize best practices of assessment ?

PG: CNN_DailyMail+WikiThesis E2: [UNK] are the interpretations of an untested rubric instrument used for the evaluations of five Virginia Academic Year Governor 's Schools -LRB- AYGS -RRB- with a focus on STEM education . How study implemented a convergent mixed methods design with data from the AYGS programs ' final evaluation reports and evaluator interviews . How do evaluators recognize best practices in curriculum planning instruction ? SQc do evaluators recognize best practices for learning environments ? SQf do evaluators recognize best practices for programming and development ? Profile do evaluators recognize best practices of learning and development ? Profile do evaluators recognize best practices of assessment ?

PG: CNN_DailyMail+WikiAll E1: [UNK] [UNK] Findings The [UNK] [UNK] [UNK] is a [UNK] [UNK] [UNK] [UNK] [UNK] [UNK] [UNK] [UNK] of the [UNK] [UNK] of [UNK] [UNK] [UNK] [UNK] [UNK] . [UNK] study focuses on the development of learning and development of learning and development . [UNK] study focuses on the development of learning and development of professional development .

Gold standard summary: The research questions that directed this study were based upon concerns from stakeholders that the 2014 Governor’s School Full-Site Evaluation rubric was an untested instrument that was leading to modifications of programming within the Governor’s Schools. The inclusive results of rubric implementation have identified general areas of strengths and weaknesses in program curriculum, professional development, program design, guidance and counseling, identification and selection processes, and facilities amongst the five schools. Evaluators who have used the instrument have similar perceptions and expectations of how AYGS faculty should implement best practices. The conclusion of this study is not to assess the effectiveness of the instrument, but condense major findings to inform evaluation designers of consequential evidence. Major findings of the study are highlighted as follows: (a) the instrument supports the development of the gifted student as an individual; (b) the instrument supports faculty that are committed to building positive relationships, scholarship, and pursuing professional development; (c) the instrument supports developing STEM-capable students through scientific exploration and civic involvement; and (d) the instrument contains constructs of importance, relevance, and usefulness. Evaluators were positive in their impressions of the AYGS evaluation procedures and welcomed opportunities to observe the spectrum of strategies implemented to deliver gifted services. The perceptions of best practices were analogous amongst participants and observed incidences of best practices manifested in diverse ways. Recommendations are for rubric designers to restructure the rubric to undergo a psychometric assessment and/or ensure the language is evaluative instead of descriptive, modify standards to increase relevancy (e.g. student identification), provide definitions for rubric terminology, and specify what evidence of program actions are to be sought to ensure quality programming.

PG: CNN_DailyMail E1: consequential scans was of an untested rubric instrument used for the evaluations of five Virginia Academic-Year Governor ’s Schools -LRB- -RRB- -RRB- -RRB- ’s Schools -RRB- -RRB- . The was so that evaluation designers may be well-informed when determining instrument efficacy . This are the interpretations of evaluators on the desired outcomes of the 2014 Governor ’s School Full-Site rubric standards ?
None

PG: CNN_DailyMail E2: CHAPTER do evaluators recognize best practices in curriculum planning instruction ? How do evaluators recognize best practices for learning environments ? How . How do evaluators recognize best practices for programming ? SQf . None

PG: WikiAll E1: Virginia Governor 's Schools -LRB- AYGS -RRB- , also known as the Virginia Governor 's Schools -LRB- AYGS -RRB- , is a United States Department of State 's Schools -LRB- [UNK] -RRB- . It is a part of the Virginia Governor 's Schools -LRB- AYGS -RRB- .

PG: WikiAll E2: The Virginia Governor Governor 's Schools -LRB- AYGS -RRB- is a part of the Virginia Department of Education -LRB- [UNK] -RRB- . It was established by the Virginia Department of Education -LRB- [UNK] -RRB- . It was established by the Virginia Department of Education -LRB- [UNK] -RRB- . The study was established by the Virginia Department of Education -LRB- [UNK] -RRB- , and was funded by the Virginia Department of Education -LRB- [UNK] -RRB- . It was funded by the Virginia Department of Education -LRB- [UNK] -RRB- . It was funded by the Virginia Department of Education -LRB- [UNK] -RRB- .

PG: CNN_DailyMail+WikiThesis E1: [UNK] do evaluators recognize best practices in curriculum planning instruction ? How recognize best practices in curriculum planning instruction ? How recognize best practices in curriculum planning instruction ? How recognize best practices in curriculum planning instruction ? How do evaluators recognize best practices for learning environments ?

PG: CNN_DailyMail+WikiThesis E2: [UNK] programming model is a study of an untested rubric instrument used for the evaluations of five Virginia Academic-Year Governor 's Schools -LRB- -RRB- -RRB- . How results were used to summarize the current findings , commendations , and recommendations among the five schools , highlight emerging trends , and encapsulate the interpretations of evaluators in their operational definitions of the rubric 's metric standards . How do evaluators recognize best practices in curriculum planning instruction for learning environments for learning and development . How do evaluators recognize best practices of learning and opportunities for positive social interaction .

FORREST, G. L. *Job Satisfaction of Female Superintendents: Role Conflict and Role Commitment*. Thesis, Virginia Tech, Mar. 2017. <http://hdl.handle.net/10919/76741>

Chapter 1

Gold standard summary: There is a need for qualified school superintendents, but only a small number are suitably qualified. Among those who apply, the percentage of women is very low. Women's leadership styles are different from men but include positive characteristics like inclusiveness, empathy, effective communication up and down the hierarchy, and broader focus. The majority of those in administrative training programs are women, yet few end up as superintendent. The purpose of this study, in Maryland, Virginia, and North Carolina is to examine different factors affecting female superintendents. Among the questions pursued are what is the relationship of job satisfaction with role conflict and role commitment. The hypothesis is that women having greater internal role conflict about balancing home and work roles will be less satisfied with their position as compared to those having greater role commitment (in home and work). This study should be worth noting by policymakers and aspirants.

PG: CNN_DailyMail E1: Buechel-Haack example , women 's leadership styles have been characterized by inclusiveness , empathy , communicating through an up and down and down hierarchy , and focusing on broader images -LRB- Wilson , 2006 -RRB- . Women has been much attention given to and research investigating the more personal or familial factors of role conflict and role commitment after achieving the superintendency is limited -LRB- Reecks-Rodgers , 2013 -RRB- . None

PG: CNN_DailyMail E2: the number of individuals qualified to do this job remains small -LRB- et al. , 2008 -RRB- . there are many positive characteristics about leadership styles of women compared to men . there are so many benefits to having women hold leadership positions , then one must wonder why they are not proportionately leaders rather than managers . None

PG: WikiAll E1: Women 's leadership model is a type of leadership that focuses on the well-being of children and families . It is a part of the broader field of leadership analysis , and is based on the premise that women 's leadership styles can be superintendents .

PG: WikiAll E2: The education administration field -LRB- superintendency -RRB- is a research hypothesis that attempts to explain the relationship between job satisfaction and job satisfaction . It is based on the premise that women 's leadership styles have a significant relationship with their level of job satisfaction . The study of women 's leadership styles have been characterized by inclusiveness , empathy , law , finance , or athletics -LRB- Burke North Carolina ? -RRB- . It is also known as the “ [UNK] ” or “ [UNK] [UNK] ” . It is also known as “ [UNK] [UNK] ” , “ [UNK] ” , and “ [UNK] ” .

PG: CNN_DailyMail+WikiThesis E1: [UNK] need exists for qualified superintendents to step into leadership roles . number of studies that show women are more democratic , more democratic , more participatory in their leadership styles . Women of the Problem and Purpose While women make up around 75 of the educational work force .

PG: CNN_DailyMail+WikiThesis E2: [UNK] is a research hypothesis that women in leadership positions operate in fields dominated by men , such as law , finance , or athletics -LRB- Burke Nelson , 2005 -RRB- . o What is the relationship between the job satisfaction and role conflict of female superintendents in Maryland , Virginia , and North Carolina , and are more likely to be instructional leaders rather than managers . What research hypothesis also states that women 's role conflict and role commitment will have a significant relationship with their level of job satisfaction . The research will deepen understanding of female leadership in education .

PG: CNN_DailyMail+WikiAll E1: [UNK] is a branch of philosophy that studies the development of leadership roles in a variety of fields . [UNK] need to step into leadership roles , but the number of individuals qualified to do this job remains small -LRB- Sutton et al. , 2008 -RRB- .

PG: CNN_DailyMail+WikiAll E2: [UNK] science is a branch of social science that studies the study of leadership styles of women and families . [UNK] is the relationship between the job satisfaction and role commitment of female superintendents in Maryland , Virginia , and North Carolina . [UNK] study is to examine the relationship between job satisfaction , role commitment as it pertains to female superintendents in Maryland , Virginia , and North Carolina . [UNK] is the relationship between role conflict and role commitment after achieving the superintendency is limited -LRB- Reecks-Rodgers et al. , 2008 -RRB- . [UNK] is the relationship between the job satisfaction and role commitment of female superintendents in Maryland , Virginia , and North Carolina .

FORREST, G. L. *Job Satisfaction of Female Superintendents: Role Conflict and Role Commitment*. Thesis, Virginia Tech, Mar. 2017. <http://hdl.handle.net/10919/76741>

Chapter 2

Gold standard summary: The literature analyzed pertinent research that illustrates and investigates the problems and practices related to female superintendents like balancing work and family, underrepresentation, concept of power, qualified but unwilling or uninterested, limited research, job satisfaction, lack of growth, effect of family life on interest or ability and pointed out that a need for further research on female superintendents in general and, particularly, the balance between these women's work and life. In doing so, three themes emerged—1) Affirming Issues, 2) Clarifying Misconstructions, and 3) Leadership Practices of Female Superintendents. While affirming the fact that women should not simply be hired due to their gender, some of the research calls for tearing down a system that can subdue female leaders or aspiring leaders. As an alternative, educators, and particularly educational leaders should be identifying a problem and creatively finding ways to adapt, resulting in a tangible, meaningful, and reasonable solution. In doing so, the conspiracy of silence would no longer be muted.

PG: CNN_DailyMail E1: superintendent's felt significantly higher concern about financial issues than the women administrators . [UNK] , however , felt significantly higher concern about financial issues than the women administrators . Additionally , however , felt significantly higher concern about financial issues than the women administrators . Additionally , however , felt significantly higher concern about financial issues than women administrators . None

PG: CNN_DailyMail E2: REVIEW -LRB- While there is a significant body of research about female superintendents once the position of superintendent has been achieved . Studies completed on the process , barriers , routes , aspirations , or motivators of females who achieve or aspire to the superintendency constitute the major share of research in this area of study . None

PG: WikiAll E1: [UNK] OF LITERATURE , also known as [UNK] or [UNK] , is a term coined by American economist [UNK] OF LITERATURE in the United States in the United States and Canada in the United States .

PG: WikiAll E2: REVIEW OF LITERATURE -LRB- 2004 -RRB- , also known as female superintendents , is a term used in the field of education in the United States and Canada -LRB- 2004 -RRB- . It is one of the world 's most prominent studies in the field of education . It is a part of the study of education in the United States in the United States and Canada . It is a part of the Association of Colleges and Universities -LRB- [UNK] -RRB- in the United States and Canada . It was established in 1998 . The study was established in 1998 .

PG: CNN_DailyMail+WikiThesis E1: REVIEW studies on female leaders in education began with a discussion of the shortage of female leaders or educational leaders in general . To studies discussed barriers to female school leadership . Eckman studies show the shortage of female leaders or educational leaders .

PG: CNN_DailyMail+WikiThesis E2: [UNK] is a body of research about female school administrators and female leadership in general -LRB- Grogan Shakeshaft , 2010 -RRB- . women are nearly twice as likely to choose work first or home first -LRB- Eckman , 2004 -RRB- compared and contrasted similarities and differences of role conflict , role commitment , and job satisfaction for high school principals . women are only tangentially related to the subject of female superintendent 's job satisfaction , role conflict , and role commitment . The studies discussed barriers to female leadership . The studies discussed the shortage of female leaders or educational leaders in general .

PG: CNN_DailyMail+WikiAll E1: REVIEW OF LITERATURE While is a [UNK] of the [UNK] of the [UNK] [UNK] of the [UNK] of the [UNK] of the [UNK] of the [UNK] of the [UNK] of the [UNK] of the [UNK] of [UNK] .

PG: CNN_DailyMail+WikiAll E2: REVIEW OF LITERATURE While [UNK] -RRB- -RRB- is a [UNK] of the [UNK] [UNK] [UNK] [UNK] -RRB- -RRB- . [UNK] is a branch of the study of female school administrators and female school administrators . [UNK] was founded in 2010 by [UNK] [UNK] and [UNK] [UNK] [UNK] [UNK] -RRB- -RRB- . [UNK] is a [UNK] of the [UNK] [UNK] [UNK] of [UNK] [UNK] [UNK] -RRB- -RRB- . [UNK] is a [UNK] of the [UNK] [UNK] [UNK] [UNK] [UNK] -RRB- . [UNK] is a [UNK] of the [UNK] [UNK] [UNK] [UNK] [UNK] -RRB- . [UNK] is a [UNK] of the [UNK] [UNK] [UNK] [UNK] [UNK] -RRB- . [UNK] is a [UNK] of the [UNK] and [UNK] [UNK] [UNK] [UNK] [UNK] .

Gold standard summary: Findings related to the research questions. Demographic and descriptive data are reported before comparing subscales. Data analysis of the relationship among variables found no statistically significant relationship between role conflict and job satisfaction, and the same with role commitment and job satisfaction. For the two independent variables, of role conflict and role commitment, there is no statistically significant relationship between them and the dependent variable, job satisfaction.

PG: CNN_DailyMail E1: Figure 4.1 have participation the percentage of 52 or 52 . Figure 4.1 provides a breakdown of total participation percentage by state . 29 or 9 respondents holding their position for less than 1 year . 29 or 9 respondents holding their position for less . None

PG: CNN_DailyMail E2: FINDINGS 4.1 provides a breakdown of total participation percentage by state , with 18 respondents from Virginia , 12 from North Carolina , and 40 of the female superintendents in Maryland . This amounts to 52 of female superintendents in North Carolina , 50 of the female superintendents in Virginia . None

PG: WikiAll E1: Figure 1 : The study of the relationship between respondents and age of female superintendents is a measure of the relationship between the state and the United States and the United States . It is a part of the broader field of data analysis . It is a part of the North Carolina Department of Public Health System . It is a part of the North Carolina Department of Public Health and Human Services . It is a part of the North Carolina Department of Public Health and Human Services .

PG: WikiAll E2: The job satisfaction subscales -LRB- also known as the job satisfaction subscales -RRB- is a measure of how respondents and age of children at home , with 18 respondents and age of children at home . The job satisfaction subscales can be divided into two categories : job satisfaction , [UNK] , and job satisfaction . The job satisfaction subscales can be divided into two different categories : job satisfaction , [UNK] , and [UNK] . The job satisfaction subscales can be divided into two different categories : job satisfaction , [UNK] , [UNK] , [UNK] , [UNK] , [UNK] , [UNK] , and [UNK] .

PG: CNN_DailyMail+WikiThesis E1: FINDINGS and descriptive data will be reported before comparing subscales . Demographic and descriptive data will be reported before comparing subscales . This and descriptive data will be reported before comparing subscales . This and descriptive data will be reported before comparing subscales .

PG: CNN_DailyMail+WikiThesis E2: [UNK] 4.1 is a role in the role of role conflict in the role of role conflict . [UNK] job satisfaction subscales include pay , promotion , supervision , fringe benefits , contingent rewards , operating conditions , coworkers , nature of work , and communication . The job satisfaction subscales include pay , promotion , supervision , fringe benefits , professional vs. self , professional vs. spouse , spouse vs. parent vs. self . The job satisfaction subscales include professional vs. self , professional vs. parent , parent vs. self . The job satisfaction subscales can be compared to identify which aspects bring cause more or less internal conflict . The who selected “ 4 ” or “ 5 ” were combined to indicate they were more committed to work than important relationships .

PG: CNN_DailyMail+WikiAll E1: [UNK] This chapter is a chapter of the [UNK] of the [UNK] of the [UNK] [UNK] of the [UNK] [UNK] [UNK] [UNK] . [UNK] was founded by [UNK] [UNK] and [UNK] [UNK] in the [UNK] [UNK] [UNK] [UNK] [UNK] .

FORREST, G. L. *Job Satisfaction of Female Superintendents: Role Conflict and Role Commitment*. Thesis, Virginia Tech, Mar. 2017. <http://hdl.handle.net/10919/76741>

Chapter 5

Gold standard summary: In summary, research hypothesis that superintendents who had greater internal role conflict would be less satisfied with their job was found not to be the case and moreover, no statistically significant relationship between role conflict and role commitment was found so this research fails to reject the null hypothesis. The major conclusion drawn was regarding the direct relationship between role conflict and role commitment, that is school boards do not want employees who are more committed to work having greater internal role conflict.

PG: CNN_DailyMail E1: conflict and job satisfaction for female superintendents was not found to be the case as there was no statistically significant relationship between them and the dependent variable , job satisfaction . Similarly , two of the three sub-questions that drove the study failed to produce statistically significant variance or relationships among variables . None

PG: CNN_DailyMail E2: research hypothesis stated that women who were more committed to either work or home would be more satisfied within their role as a superintendent . There was a negligibly stronger relationship between role conflict and job satisfaction than between role commitment and job satisfaction . Similarly , two of the three sub-questions that drove the study failed to produce statistically significant variance or relationships among variables . None

PG: WikiAll E1: Conclusion One is a research hypothesis that attempts to explain the role conflict and job satisfaction of female superintendents . It is based on the premise that job satisfaction for female superintendents should be more committed to job satisfaction , job satisfaction , job satisfaction , and job satisfaction .

PG: WikiAll E2: A school district is a type of public school district in which two independent variables can be placed on a school district with a mutually supportive and beneficial work environment . It is also known as “ [UNK] [UNK] ” or “ [UNK] role conflict ” . It is also known as “ [UNK] [UNK] ” , “ [UNK] ” , “ [UNK] ” , “ [UNK] ” , “ [UNK] ” , “ [UNK] ” , “ [UNK] ” , “ [UNK] ” , “ [UNK] ” , “ [UNK] ” , “ [UNK] ” , “ [UNK] ” , “ [UNK] ” , “ [UNK] ” , “ [UNK] ” , “ [UNK] ” , “ [UNK] ” , “ [UNK] ” , “ [UNK] ” , “ [UNK] ” and “ [UNK] ” -RRB- .

Gold standard summary: Intelligent Transportation Systems' performance depends in part on the output of traffic monitoring systems. Problems with those systems are addressed through: • A traffic monitoring approach that provides reliable traffic information; • Formulation of the traffic monitoring problem in Kalman Filter framework; and • A dynamic power management approach based on traffic flow theory that reduces energy cost of traffic monitoring. A novel infrastructural traffic monitoring approach estimates traffic information by combining three sensing techniques based on two categories of sensors: a background subtraction algorithms on video data, measuring distance using a laser, and using laser range finders. A dynamic power management system shifts to inactive state using traffic flow theory to determine when that is appropriate.

PG: CNN_DailyMail E1: 1.1 Background Intelligent Transportation -LRB- -LRB- -RRB- has been developing for several decades with solid theoretical basis . By improving transportation safety and mobility , tive infrastructures control and advising traffic planning and relative policy making , ITS provides effective solutions to rapidly growing traffic challenges . • To propose a traffic monitoring method that could provide stable and reliable traffic monitoring . None

PG: CNN_DailyMail E2: traffic monitoring system fundamentally influences the overall performance of ITS . most of these processes have Yi Tian Chapter 1 . To currently multiple options for traffic monitoring are available , most of them have problems in different respects . 1.2 Objectives The primary objectives of this thesis are as follows . None

PG: WikiAll E1: The following outline is provided as an overview of and topical guide to traffic monitoring -LRB- ITS -RRB- , traffic monitoring system -LRB- ITS -RRB- and traffic monitoring system -LRB- ITS -RRB- . It is a type of traffic monitoring system .

PG: WikiAll E2: Background Intelligent Transportation System -LRB- ITS -RRB- is a type of traffic monitoring system developed by [UNK] [UNK] and [UNK] [UNK] in the United States and Canada . It was developed by [UNK] [UNK] and [UNK] [UNK] in 2016 . It is a part of the Intelligent Transportation System -LRB- [UNK] -RRB- . It is a part of the Intelligent Transportation System -LRB- [UNK] -RRB- . It is a part of the Intelligent Transportation System -LRB- [UNK] -RRB- . It is a part of the Intelligent Transportation System -LRB- [UNK] -RRB- system . It is based on the set of traffic monitoring and traffic monitoring systems .

PG: CNN_DailyMail+WikiThesis E1: 1.1 Background Intelligent Transportation System -LRB- -LRB- -RRB- -RRB- is a traffic monitoring system that could provide stable and reliable traffic flow data to administrations and individual drivers . These requirements significantly increases the installation cost and influences system portability .

PG: CNN_DailyMail+WikiThesis E2: 1.1 Background Intelligent Transportation System -RRB- has been developing for several decades with solid theoretical basis and is gaining increasing attention from both industry and academia . By currently multiple options for traffic monitoring are available , most of them have problems in different respects . The sensors are to function in uncontrolled environment , most of these processes have Yi Tian Chapter 1 . The a result , the output of traffic monitoring system plays an important role by constantly providing traffic flow data to administrations and individual drivers and makes the base for full function of system .

PG: CNN_DailyMail+WikiAll E1: [UNK] Intelligent Transportation System -LRB- -RRB- -RRB- is a [UNK] traffic monitoring system developed by [UNK] [UNK] and [UNK] [UNK] . [UNK] is a [UNK] [UNK] [UNK] [UNK] -RRB- -RRB- -RRB- -RRB- . [UNK] is a part of the [UNK] [UNK] [UNK] [UNK] [UNK] [UNK] .

PG: CNN_DailyMail+WikiAll E2: [UNK] monitoring system is a system of traffic monitoring and traffic monitoring and traffic monitoring systems . [UNK] monitoring system is based on traffic flow theory , which is based on traffic flow theory . [UNK] monitoring system plays an important role in traffic monitoring and advising traffic planning and relative policy making , ITS provides effective solutions to rapidly growing traffic challenges . [UNK] , traffic monitoring system plays an important role in uncontrolled environment , providing real-time route guidance and adap - tive infrastructures control and advising traffic flow data to administrations and individual drivers and makes the base for full function of system . [UNK] currently multiple options for traffic monitoring are available , most of them have problems in different respects .

TIAN, Y. Self-Powered Intelligent Traffic Monitoring Using IR Lidar and Camera. Thesis, Virginia Tech, Feb. 2017. <http://hdl.handle.net/10919/74949>

Chapter 2

Gold standard summary: Approaches to traffic monitoring, emphasizing infrastructural traffic monitoring (including pneumatic tube sensors, inductive loop sensors, microwave radars, probe vehicle measurement, and machine vision sensors), and dynamic power management (DPM) techniques in traffic monitoring, are reviewed, covering principles, advantages, and disadvantages. The three different basic DPM strategies (greedy, time-out, and predictive) are all based on the understanding of system power consumption and workload properties; for the same system in different functioning stages, different strategies can be implemented.

PG: CNN_DailyMail E1: Chapter 2 Literature Review 2.1 Introduction In 2.1 Introduction In this chapter , a summary of approaches to traffic monitoring . 6 Yi Tian monitoring 2.2.1 monitoring 2.2.1 Current traffic monitoring techniques Traffic monitoring systems that have been widely widely . None

PG: CNN_DailyMail E2: 6 Yi Tian Chapter 2 Literature Review 2.1 Introduction In on infrastructural traffic monitoring . sensors can be categorized into two group based on how they interact with passing vehicles : Contact loop sensors , microwave radars , machine vision sensors , etc. . 6 Yi one of the most widely used techniques used in traffic monitoring , the advantages of pneumatic tube lies in its inexpensive installation , portability and robustness in different conditions . None

PG: WikiAll E1: Chapter 2 Literature Review 2.1 is a United States federal law that aims to prevent traffic monitoring , traffic monitoring and traffic monitoring systems . It is based on the principles of traffic monitoring and traffic monitoring .

PG: WikiAll E2: A pneumatic tube detector -LRB- em -RRB- is a type of traffic monitoring device that is used to detect and monitor traffic conditions in a traffic system . It is a type of traffic monitoring systems that can be used in traffic monitoring , traffic monitoring , traffic monitoring , traffic monitoring , traffic monitoring , traffic monitoring , traffic monitoring , traffic monitoring , traffic monitoring , traffic monitoring , traffic monitoring , traffic monitoring , traffic monitoring , traffic monitoring , traffic monitoring , traffic monitoring , traffic monitoring , and traffic monitoring . This article deals with the use of pneumatic tube sensors to measure local traffic conditions in the intelligent transportation system .

PG: CNN_DailyMail+WikiThesis E1: [UNK] Tube tube sensor is a review of dynamic power management techniques in traffic monitoring systems . sensors can be categorized into two group based on how they interact with passing vehicles : Contact sensors and non-contact sensors .

PG: CNN_DailyMail+WikiThesis E2: [UNK] is a traffic monitoring technique used in traffic monitoring and traffic monitoring systems . The traffic monitoring sensors can be categorized into two group based on how they interact with passing vehicles , microwave radars , machine vision sensors , microwave radars , inductive loop sensors , inductive loop sensors and non-contact sensors . The tube sensors are mostly used as a temporary solution for road with non-intense traffic condition . The tube sensors are mostly used as a temporary solution for road with non-intense loop detector data . The tube sensors are used to [UNK] the use of commercially available pneumatic tube counters to count bicycles in normal traffic conditions .

PG: CNN_DailyMail+WikiAll E1: [UNK] traffic monitoring is a form of traffic monitoring systems that can be used to measure traffic monitoring systems . [UNK] traffic monitoring is used to determine the use of pneumatic tube traffic monitoring solutions to traffic monitoring systems .

PG: CNN_DailyMail+WikiAll E2: [UNK] traffic monitoring is a type of traffic monitoring technique used in traffic monitoring . [UNK] tube sensors are designed to determine the use of pneumatic tube sensors to measure vehicle speed and length . [UNK] sensors can be used as a temporary solution for road with non-intense traffic condition . [UNK] traffic monitoring can be applied to traffic monitoring systems , such as traffic monitoring , traffic monitoring , traffic monitoring , traffic monitoring , traffic monitoring , traffic monitoring , traffic monitoring , and traffic monitoring . [UNK] sensors can be categorized into two group based on how they interact with passing vehicles , inductive loop sensors , microwave radars , machine vision sensors , etc .

TIAN, Y. Self-Powered Intelligent Traffic Monitoring Using IR Lidar and Camera. Thesis, Virginia Tech, Feb. 2017. <http://hdl.handle.net/10919/74949>

Chapter 3

TIAN, Y. Self-Powered Intelligent Traffic Monitoring Using IR Lidar and Camera. Thesis, Virginia Tech, Feb. 2017. <http://hdl.handle.net/10919/74949>

Chapter 4

Gold standard summary: The traffic monitoring approach is described in detail starting with three detection techniques (measurement with Lidar, camera, and laser points in frame). Then, formulation of traffic monitoring in the Kalman filter framework is presented, including state definition, motion model, and sensor model. After that, sensor fusion by grid-based method is introduced, followed by how non-Gaussian uncertainty is handled. Finally, the whole traffic information estimation process is summarized and comprehensively explained.

PG: CNN_DailyMail E1: 4.1 Multipoint measurement in traffic monitoring Figure 4.1 how Lidar measurement in traffic monitoring Figure 4.1 how Lidar measurement in traffic monitoring Figure 4.1 how Lidar measurement is working in the developed traffic monitoring . the data 's highly data-driven system , the amount and class of the feed-in traffic information directly determines the system 's functionality and applicability . 4.1 Multipoint measurement in traffic monitoring Figure 4.1 illustrates how Lidar measurement is working in the developed traffic monitoring . None

PG: CNN_DailyMail E2: As ITS is highly data-driven system , the amount and class of the feed-in traffic information directly determines the system 's functionality and applicability . the data fusion produces best estimation based on the collected data . the system is based on the fusion of three techniques realized by two types of sensors , a Lidar array and a near infrared -LRB- NIR camera sensor . None

PG: WikiAll E1: [UNK] traffic monitoring -LRB- Lidar -RRB- is a measure of how traffic information can be improved . It is based on the fusion of three techniques : traffic monitoring , traffic monitoring , traffic monitoring , traffic monitoring , traffic monitoring , and traffic monitoring .

PG: WikiAll E2: Figure 1 : Background subtraction algorithm -LRB- ROI -RRB- is a type of data fusion developed by [UNK] and [UNK] . It is used to describe the performance of traffic information in traffic monitoring and traffic monitoring . It is a type of traffic monitoring system , which can be used to measure the distance between the transmitter and projecting point on the road plane . It is also used in traffic monitoring and traffic monitoring . It is also used in traffic monitoring and traffic monitoring . It is also used in traffic monitoring and traffic monitoring . It is also used in the field of traffic monitoring , traffic monitoring , traffic monitoring , traffic monitoring , and traffic monitoring .

PG: CNN_DailyMail+WikiThesis E1: Chapter proposed approach is based on the fusion of three techniques realized by two types of sensors , a Lidar array and a near infrared -LRB- NIR camera sensor . To proposed approach is based on the fusion of three techniques .

PG: CNN_DailyMail+WikiThesis E2: [UNK] model is a traffic monitoring system that uses a variety of traffic information . [UNK] measurement is used to remove noise and resize the reliability of vehicle speed and size classification . The the algorithm is based on the fusion of three techniques realized by two types of sensors , a Lidar array and a near infrared -LRB- NIR -RRB- camera sensor . The camera collects optical information of lanes on a per pixel basis and provides 2D information about the lanes . Each camera collects optical information of the camera . The camera collects the camera and [UNK] the data fusion .

PG: CNN_DailyMail+WikiAll E1: [UNK] traffic monitoring is a form of traffic monitoring systems that can be used to determine the distance between the transmitter and projecting point on the road or other obstacles . [UNK] proposed approach is based on video frame information .

PG: CNN_DailyMail+WikiAll E2: [UNK] measurement is a type of traffic monitoring system used to determine the system 's functionality and applicability of the system . [UNK] measurement is based on the fusion of three types of sensors , the amount and class of the feed-in traffic information directly determines the system 's functionality and applicability . [UNK] proposed approach produces traffic information including passing vehicle counts , corre - sponding travel speed and vehicle classification , for each individual vehicles . [UNK] ITS is highly data-driven system , the amount and class of the feed-in traffic information directly determines the system 's functionality .

PG: CNN_DailyMail+WikiAll E2: [UNK] power management is a system of traffic monitoring systems that can be applied to traffic monitoring systems . [UNK] traffic flow theory , a power management strategy in power management is an adaptive preemptive DPM strategy in power management systems . [UNK] power management strategy is used to determine the power consumption of traffic monitoring systems . [UNK] traffic flow theory , a power management strategy in power management is a power management strategy that describes the working process of DPM and traffic monitoring systems . [UNK] traffic flow theory , a power management strategy is designed to detect the next passing vehicle , such as traffic flow theory , and traffic monitoring .

TIAN, Y. Self-Powered Intelligent Traffic Monitoring Using IR Lidar and Camera. Thesis, Virginia Tech, Feb. 2017. <http://hdl.handle.net/10919/74949>

Chapter 6

Gold standard summary: The developed system prototype is presented with solar panel, sensor array, and base, also involves Hardware components (Lidar, camera, computing unit) installation and calibration. The system power state machine is described and its power consumption properties, with both Lidar and camera, measured and tested.

PG: CNN_DailyMail E1: Chapter Development In the development of the self-powered traffic monitoring system , two prototypes have been built and tested in field . system hardware design and building are discussed , followed with system installation and calibration details in experience . None

PG: CNN_DailyMail E2: two prototypes have been built and tested in field . the system is mainly composed of four units : computing unit with vehicle state estimator and dynamic power manager , power supply unit with energy harvesting component , sensor unit and communication unit . The system mainly has four units including power supply unit , computing unit , sensor unit and communication unit . None

PG: WikiAll E1: Chapter 6 System Development -LRB- [UNK] -RRB- is a traffic monitoring system developed by the United States National Advisory Committee for Aeronautics and Space Engineers -LRB- [UNK] -RRB- . The system is used in the development of traffic monitoring systems .

PG: WikiAll E2: [UNK] traffic monitoring system -LRB- [UNK] -RRB- is a type of traffic monitoring system developed by the United States Environmental Protection Agency -LRB- EPA -RRB- . The system is designed for communication purposes and can be used for communication purposes . The system is designed to be used in computing units and is used for power management applications . The system is used in conjunction with the [UNK] system . It is used in conjunction with power management systems . The system is based on the concept of [UNK] traffic monitoring system . It is also used in a variety of applications including [UNK] , [UNK] , [UNK] , [UNK] , [UNK] , [UNK] , and [UNK] .

PG: CNN_DailyMail+WikiThesis E1: [UNK] traffic monitoring system is used to create a [UNK] system . [UNK] system is used for power management purpose . The unit is composed of two types of power supply unit , computing unit , sensor unit , sensor unit and communication unit .

PG: CNN_DailyMail+WikiThesis E2: [UNK] traffic monitoring system schematic Figure 6.1 is a proposed system that uses 905nm wavelength laser beam to monitor 4 lanes in two direction . The camera has a frame rate of 30 and the resolution is designed to be portable and scalable . The system mainly has four units including power supply unit , computing unit , sensor unit and communication unit . The battery through inverter supplies stable DC power to computer and other electronics . The unit is composed of two types of sensors including a Lidar array and an IR camera . the system is mainly composed of four units : computing unit with vehicle state estimator and dynamic power manager , power supply unit with energy harvesting component , sensor unit and communication unit .

PG: CNN_DailyMail+WikiAll E1: [UNK] 6 System Development [UNK] [UNK] [UNK] is a [UNK] traffic monitoring system developed by [UNK] [UNK] in the [UNK] [UNK] [UNK] [UNK] [UNK] [UNK] . [UNK] system was developed by [UNK] [UNK] and [UNK] [UNK] .

PG: CNN_DailyMail+WikiAll E2: [UNK] traffic monitoring system is a type of traffic monitoring system developed by [UNK] [UNK] and [UNK] [UNK] [UNK] . [UNK] was developed by [UNK] [UNK] [UNK] and [UNK] [UNK] [UNK] and [UNK] [UNK] [UNK] [UNK] Solar Solar . [UNK] system was developed by [UNK] [UNK] and [UNK] [UNK] [UNK] [UNK] [UNK] [UNK] . [UNK] system was developed by [UNK] [UNK] [UNK] and [UNK] [UNK] [UNK] [UNK] [UNK] [UNK] . [UNK] system was developed by [UNK] [UNK] and [UNK] [UNK] [UNK] [UNK] [UNK] [UNK] . [UNK] system was developed by [UNK] [UNK] and [UNK] [UNK] [UNK] [UNK] [UNK] [UNK] . [UNK] system was developed by [UNK] [UNK] [UNK] [UNK] [UNK] [UNK] . [UNK] system was developed by [UNK] [UNK] [UNK] and [UNK] [UNK] .

TIAN, Y. Self-Powered Intelligent Traffic Monitoring Using IR Lidar and Camera. Thesis, Virginia Tech, Feb. 2017. <http://hdl.handle.net/10919/74949>

Chapter 7

Gold standard summary: Multiple simulations have been conducted to evaluate the effect of the three power state transition policies used for dynamic power management. To fully analyze all the policies, parametric study has been done in both day and night, busy and free road, close and far section from traffic lights. Based on the simulations, the power management strategy in the developed traffic monitoring system has shown to be able to reduce a decent amount of energy cost and still achieve reasonable detection accuracy by proper parameter setting. In power management based on congestion recognition, about 10% of energy cost is saved in sacrifice of only about 5% detection. Because multiple detection is triggered for each individual vehicle, such sacrifice is very close to a neglectable level. In power management based on inter-vehicle power state transition, by properly configuring service-requester, about 12% energy reduction is achieved in sacrifice of no detection missing. Power management based on inter-group state transition have various performance in different traffic condition. For example, its performance at night is much better than in daytime. And to achieve same amount of energy cost reduction, mostly more missing detection would happen.

PG: CNN_DailyMail E1: Chapter 7 System Experimental Results Multiple Multiple Multiple field tests have been conducted to validate the reliability and accuracy of the system in traffic monitoring . the chapter , experiment setup , field test and simulation results and analysis are presented . 7.1 Experiment setup Field test has been conducted in five locations in Blacksburg , VA around Virginia Tech campus . None

PG: CNN_DailyMail E2: Chapter 7 System Experimental Results Field test has been conducted in five locations in Blacksburg , VA around Virginia Tech campus . the tests , simulations of system power consumption are made with the power state model in built in Chapter 6 . 7.2 Traffic monitoring result The traffic flow variables that system is attempting to estimate is vehicle count , traveling speed and vehicle size . None

PG: WikiAll E1: Chapter 7 System of Interest and Lidar devices -LRB- Lidar -RRB- is a type of traffic monitoring system used in traffic monitoring and traffic monitoring . It is administered by the United States Department of Transportation -LRB- [UNK] -RRB- .

PG: WikiAll E2: Field test estimation is a measure of how the individual measurement of a vehicle is installed . It is a measure of measurement of a vehicle that is used to determine the performance of a vehicle . It is a measure of measurement of a vehicle 's length and length estimation . It can be used to predict the performance of a vehicle , such as a bicycle or bicycle , and in a [UNK] manner . In addition , the measurement of the vehicle body is called a “ [UNK] ” or “ [UNK] [UNK] ” . In the case of [UNK] , the measurement of the system is [UNK] .

PG: CNN_DailyMail+WikiThesis E1: Chapter 7 System Experimental test has been conducted in five locations in Blacksburg , VA around Virginia Tech campus . 7.1 Experiment setup Field test has been conducted in five locations in Blacksburg , VA around Virginia Tech campus . 7.2 Traffic traffic flow variables that system is attempting to estimate is aimed for long-term test .

Gold standard summary: This thesis presented a reliable and power efficient self-powered traffic monitoring approach which is composed of sensor (Lidar and IR camera) and power supply components. Multiple techniques for traffic monitoring and Dynamic Power Management are proposed; and the accuracy and reliability of the system has been evaluated after multiple field tests. Three potential avenues for future work have been proposed which include adding an optical filter to reduce noise from unwanted noise sources, conducting an integrated testing for determining the overall efficiency of the derived power management strategy, and developing a network-level DPM for better service request time prediction and energy savings.

PG: CNN_DailyMail E1: 8.1 Conclusion This thesis has proposed a self-powered traffic monitoring approach with key feature of its reliability and power efficiency . The system is mainly composed of two components , sensor component and power supplying component . the three different traffic monitoring techniques are realized using ToF measurement , 2D RGB measurement and Lidar laser point tracking respectively . None

PG: CNN_DailyMail E2: 8.1 system is mainly composed of two components , sensor component and power supplying component . Sensor component hardware-wise includes a Lidar array and an IR imaging sensor . In power consumption reduction from the developed dynamic power manager , multiple simulations have been conducted for each power state transition policy . None

PG: WikiAll E1: Power state machine -LRB- also known as [UNK] -RRB- is a type of power management system that can be used to determine the power consumption of a traffic state transition policy . It is a type of traffic monitoring system .

PG: WikiAll E2: The Dynamic Power Management System -LRB- Sensor -RRB- is a traffic monitoring system that uses power consumption analysis to evaluate power consumption . The system was developed by [UNK] [UNK] and [UNK] at the University of Virginia . It was developed by [UNK] [UNK] and [UNK] [UNK] at the University of Pittsburgh . The system was developed by [UNK] [UNK] and [UNK] [UNK] at the University of Pittsburgh . The system was developed by [UNK] [UNK] and [UNK] [UNK] at the University of Pittsburgh . The system was developed by [UNK] [UNK] and [UNK] [UNK] . The system was developed by [UNK] [UNK] and [UNK] [UNK] .

NACIRI, W. M. Bug Finding Methods for Multithreaded Student Programming Projects. Thesis, Virginia Tech, Aug. 2017. <http://hdl.handle.net/10919/78675>

Chapter 1

Gold standard summary: Parallel programming is becoming ubiquitous with an increasing number of cores. Using multithreading, a performance speedup can be experienced due to concurrent execution of threads. Educators' efforts to improve curriculum related to threads can benefit from a special debugging tool to make it easier to program threads, that helps students to better understand bugs and provides a high level description relating to their cause. Past students had expressed difficulty working on fork-join framework; their feedback is a driving factor of the research. Existing debugging tools, such as Helgrind, focus strictly on data-races. They do not identify and describe the high-level root cause of bugs. Willgrind is a special-purpose debugging tool, that is built from scratch using the Valgrind framework, can directly detect bugs and provide high-level descriptions about their cause. WillgrindPlus is a tool that indicate if the student program is vulnerable to a bug that can manifest itself in a different execution. Both Willgrind and WillgrindPlus provide output through an interactive web interface. A user study was performed on Virginia Tech students to evaluate the effectiveness and usefulness of tools. A plethora of different bugs were detected in their submissions.

PG: CNN_DailyMail E1: Modern day processors has remarkable performance advantages , they are difficult to program . educators have been determined to improve their curriculum related to threads -LSB- 22 -RSB- . educators have remarkable performance advantages , they are difficult to program . educators have remarkable performance advantages , they are difficult to program . None

PG: CNN_DailyMail E2: A thread is a unit of sequential execution that can be scheduled to a distinct core . A multithreaded application can experience a performance speedup when multiple threads execute concurrently . A is usually the rst time they are exposed to multithreading . None

PG: WikiAll E1: The fork-join framework is a software framework for computer debugging and software development . It is based on the principles of parallel programming , and is based on the idea that multithreaded programming is the problem of multithreaded programming . It is based on the idea that threads are scheduled to be able to execute recursive tasks in parallel programming .

PG: WikiAll E2: Willgrind programming is a framework for debugging and [UNK] programming . It is a [UNK] debugging tool developed by [UNK] [UNK] and published by [UNK] . It is a [UNK] debugging tool developed by [UNK] [UNK] and [UNK] [UNK] . The fork-join framework was developed by [UNK] [UNK] and published by [UNK] . The project was developed by [UNK] [UNK] , [UNK] [UNK] , and [UNK] [UNK] . The fork-join framework was developed by [UNK] [UNK] , [UNK] [UNK] , and [UNK] [UNK] . The fork-join framework was developed by [UNK] [UNK] , [UNK] [UNK] , and [UNK] [UNK] . The fork-join framework was developed by [UNK] [UNK] , [UNK] [UNK] , and [UNK] [UNK] .

PG: CNN_DailyMail+WikiThesis E1: [UNK] day processors feature an increasing number of cores each year . parallel programming has become ubiquitous . A thread is a unit of sequential execution that can be scheduled to a distinct core . A thread is a unit of sequential execution that can be scheduled to a distinct core .

PG: CNN_DailyMail+WikiThesis E2: [UNK] day processors feature an increasing number of cores each year . students face obstacles such as deadlock , lifelock , data-races , and ordering violations -LSB- 37 -RSB- . The goal of a fork-join framework is to provide an interface for divide-and conquer algorithms to execute recursive tasks in parallel . The goal is to improve upon pure data-race detectors by leveraging program-specific information . The goal is to improve upon existing classroom tools and methods for debugging this challenging programming assignment . We goal is to improve upon existing classroom tools and methods to analyze student submissions .

PG: CNN_DailyMail+WikiAll E1: [UNK] programming is the use of a computer program to create a computer program . [UNK] can be applied to a wide range of activities , including the design of thread management and synchronization primitives .

PG: CNN_DailyMail+WikiAll E2: [UNK] computer science , parallel programming is a branch of computer science that allows students to take an upper level computer systems class . [UNK] programming is usually taught as a specialized topic at senior and graduate levels in research universities . [UNK] the fork-join framework teaches students about thread management and synchronization primitives . The is a special-purpose debugging tool for the fork-join framework project that performs dynamic program analysis . [UNK] is a special-purpose debugging tool for the fork-join framework project . [UNK] is a [UNK] framework for the fork-join [UNK] [UNK] [UNK] [UNK] Tech . [UNK] was developed by [UNK] [UNK] [UNK] and [UNK] [UNK] [UNK] [UNK] Tech .

NACIRI, W. M. Bug Finding Methods for Multithreaded Student Programming Projects. Thesis, Virginia Tech, Aug. 2017. <http://hdl.handle.net/10919/78675>

Chapter 2

Gold standard summary: In divide and conquer algorithms, a problem is divided into many independent subproblems. These subproblems can be solved independently using a multithreading framework. The fork-join framework, such as for Java (with constructs like future, submit, get, and free) is efficient, simple, and provides regularity. It is taught through programming projects in computer science courses at Virginia Tech. If some threads become idle while others are working, that can reduce the performance of the framework. A work stealing strategy can be used to rectify this problem. To catch bugs, static and dynamic program analysis can be done. Since static program analysis can not catch runtime bugs, it is limited. Valgrind, a dynamic binary instrumentation framework, disassembles the client binary into an intermediate representation, instruments it, and re-assembles into machine code using dynamic binary. Valgrind runs as a single thread and the execution of client threads is serialized with, each thread being correctly abstracted and registered with the kernel.

PG: CNN_DailyMail E1: Background This Spawning Spawning Spawning a new thread for each forked task creates prohibitively high overhead because creating and destroying threads is relatively . The are popped in the queues in LIFO order which leads to ecient execution when there is plenty of work . None

PG: CNN_DailyMail E2: 2.1 Fork-Join Parallelism In divide and conquer algorithms . The framework is responsible for mapping distinct subproblems or tasks to threads . The are usually independent and can be solved separately , which allows them to be parallelized using a thread framework . None

PG: WikiAll E1: The Java programming language -LRB- fork-join -RRB- framework is a framework for the design of multithreaded programming . It was developed by [UNK] [UNK] and [UNK] [UNK] in 2001 . The fork-join framework is based on the Java fork-join framework .

NACIRI, W. M. Bug Finding Methods for Multithreaded Student Programming Projects. Thesis, Virginia Tech, Aug. 2017. <http://hdl.handle.net/10919/78675>

Chapter 3

Gold standard summary: The shadow values contain useful information to identify bugs, making shadowing a common technique used by dynamic program analysis tools like Willgrind to detect bugs at run-time. Invariants are the conditions that must hold true during the correct execution of a program. Identifying invariant violations can be used to establish the correctness of a program. The run-time code and instrumentation code in Willgrind runs on the host CPU. While the function replacements run in the guest space. Deadlock is a difficult to detect situation where the system does not make progress because threads are blocked forever, such as two threads requesting each other's locks. Willgrind provides accurate deadlock detection by leveraging program-specific knowledge. Since, visualizations speed up the debugging process, in Willgrind the bugs are reported through a friendly web interface.

PG: CNN_DailyMail E1: Valgrind role of a Valgrind tool is to utilize with the correct 's [UNK] chapter . the Valgrind tool is a common technique used by dynamic program analysis tools -LSB- 41 , 44 , 6 -RSB- to detect bugs . None

PG: CNN_DailyMail E2: 3.1 Design Shadowing is a common technique used by dynamic program analysis tools -LSB- 41 , 44 , 6 -RSB- to detect bugs at run-time . The uses shadowing to model the correct execution of a fork-join framework and verify that the target program obeys this model . None

PG: WikiAll E1: Valgrind is a software development tool developed by [UNK] Software . It is based on the principles of the fork-join framework . It is based on the premise that the Valgrind framework can be thought of as a result of the [UNK] framework .

PG: WikiAll E2: The fork-join Model Futures -LRB- Valgrind -RRB- is a tool used in the field of dynamic program analysis . It was developed by [UNK] [UNK] and published by [UNK] . The tool was developed by [UNK] [UNK] and published by [UNK] . The tool was originally developed by [UNK] [UNK] and published by [UNK] . The tool was originally developed by [UNK] [UNK] and [UNK] [UNK] . The tool was originally developed by [UNK] [UNK] and [UNK] [UNK] . The tool was originally developed by [UNK] [UNK] and [UNK] [UNK] . The tool was originally developed by [UNK] [UNK] and [UNK] [UNK] in 2001 .

PG: CNN_DailyMail+WikiThesis E1: [UNK] tool is to utilize the framework suitably in order to analyze a target program . The role of a Valgrind tool is to utilize the framework suitably in order to analyze a target program . The role of a Valgrind tool is to utilize the framework suitably in order to analyze a target program .

PG: CNN_DailyMail+WikiThesis E2: [UNK] model is a [UNK] tool used to detect bugs at run-time . [UNK] tool uses shadow memory -LSB- 41 -RSB- to track a memory location . A memory is a value pertaining to a memory location , maintained by the tool , to describe its state . A memory is a value pertaining to a memory location , maintained by denying the reverse : the result of a invariant violation of a program . The memory is the result of a invariant violation of a fork-join framework . The memory is a value pertaining to a model future .

PG: CNN_DailyMail+WikiAll E1: [UNK] is a software tool that provides the low-level infrastructure to support program instrumentation . [UNK] is a part of the [UNK] programming language -LSB- [UNK] -RSB- . [UNK] was developed by [UNK] [UNK] and [UNK] [UNK] .

NACIRI, W. M. Bug Finding Methods for Multithreaded Student Programming Projects. Thesis, Virginia Tech, Aug. 2017. <http://hdl.handle.net/10919/78675>

Chapter 4

Gold standard summary: WilgrindPlus extends Wilgrind, also providing happens before based checking. It does not include semantic violations and deadlock. Happens-before violations indicate a latent failure in the execution. Willgrind has to be run several times to detect a bug; it does nothing when a bug is hidden by the scheduling, limiting its detection by the scheduler. WelgrindPlus rectifies this problem and leverages happens-before based checking to augment detection. Students only need to run the tool a minimal number of times to detect dormant bugs. Vector clocks, each assigned to a process, are used to check happens-before relationships of model future state transitions, ensuring proper thread synchronization exists between the state transitions. Each model future state transition is assigned a vector timestamp (VTS) in order to validate happens-before relationships between transitions. An adjacency matrix is used to represent the happens-before relationships and the Floyd-Warshall algorithm is used to add transitive happens-before relationships. Using lock-free programming, atomic operations are able to concurrently access memory without the use of locks. This influential standard must be considered when designing multithreaded applications. Datarace of WillgrindPlus must be suppressed to support concurrent access to an atomic done flag.

PG: CNN_DailyMail E1: ValgrindPlus 4.1 might execute correctly hundreds of times before a subtle synchronization bug appears -LSB- the new happens-before checking . the bug would only manifest itself for certain thread interleavings . This is accomplished by utilizing happens-before engine . When the new happens-before checking , ValgrindPlus is nearly identical to the original tool so we established a shared code base to avoid code clones . None

PG: CNN_DailyMail E2: ValgrindPlus Valgrind can only detect bugs that it observes in a given execution and makes no guarantees about other executions . This is accomplished by utilizing happens-before engine . This is nearly identical to the original tool so we established a shared code base to avoid code clones . None

NACIRI, W. M. Bug Finding Methods for Multithreaded Student Programming Projects. Thesis, Virginia Tech, Aug. 2017. <http://hdl.handle.net/10919/78675>

Chapter 5

Gold standard summary: Performance, effectiveness, and usefulness metrics were included in a user study in Computer Science at Virginia Tech to evaluate Willgrind and WillgrindPlus, comparing with Nullgrind and Helgrind – all four run under the Valgrind framework. Since the execution of threads in Valgrind is serialized, threads can be blocked for extended periods of time when waiting to run, causing performance degradation. To rectify this, the processor affinity of Valgrind should be set for all threads to run on a single core. The test suite for users is comprised of a medley of familiar divide-and-conquer algorithms and each algorithm is assessed with various sizes and thread counts. The results indicate that the overhead in Willgrind is primarily dominated by the Valgrind recompilation process. Since WillgrindPlus does not check for data-races, a performance improvement is possible by removing unnecessary vector clocks. Effectiveness evaluation to analyze the ability of Willgrind and WillgrindPlus to detect bugs was performed. After analyzing the anonymous code evaluation, a majority of respondents believe the tool definitely helped them detect at least one bug in their code. Additionally, none of the respondents said the tool definitely did not help to catch a bug. Overall, the survey indicated that the tool is important, useful, and credible to the students.

PG: CNN_DailyMail E1: Evaluation evaluate the Valgrind and ValgrindPlus tools , we use three metrics : performance , effectiveness , and usefulness ' The performance , effectiveness , and usefulness . performance , effectiveness . performance , effectiveness , and usefulness . performance , effectiveness , and usefulness . performance , effectiveness , and usefulness . None

PG: CNN_DailyMail E2: Evaluation effectiveness evaluation assesses the cost of dynamic program analysis . The , the usefulness evaluation investigates how important the tool is for users . we compared the overhead of four tools : Nullgrind , Valgrind , ValgrindPlus , and Helgrind . None

PG: WikiAll E1: The Valgrind is a tool developed by the Virginia Institute of Computer Systems at Virginia Tech . It has been superseded by the Virginia Tech Institutional Review Board -LRB- Valgrind -RRB- . It is used by the Virginia Tech Institutional Review Board -LRB- Valgrind -RRB- . It is used by the Virginia Tech Institutional Review Board -LRB- Valgrind -RRB- . It is used by the Virginia Tech Institutional Review Board -LRB- Valgrind -RRB- . It is used by the Virginia Tech Institutional Review Board -LRB- Valgrind -RRB- .

PG: WikiAll E2: The Virginia Tech Institutional Review Board -LRB- Valgrind -RRB- is a suite of [UNK] tools for users of Computer Systems , Computer Systems , Computer Systems , Computer Systems , Computer Systems , Computer Systems , Computer Systems , Computer Science , Computer Science , Computer Science , and Computer Science at Virginia Tech . It is a part of the Virginia Tech Institutional Review Board -LRB- IRB 17-093 -RRB- . It is a part of the Virginia Tech Institutional Review Board -LRB- IRB 17-093 -RRB- . It is a part of the Institutional Review Board -LRB- IRB -RRB- .

PG: CNN_DailyMail+WikiThesis E1: [UNK] suite is used to run programs without instrumentation or analysis . The suite is comprised of a medley of familiar divide-and-conquer algorithms such as merge sort , bonacci , and queens puzzle . The suite is comprised of a medley of familiar divide-and-conquer algorithms such as merge sort , bonacci , and queens puzzle . The suite is comprised of a medley of familiar divide-and-conquer algorithms such as merge sort , bonacci , and queens puzzle .

PG: CNN_DailyMail+WikiThesis E2: [UNK] is a tool used to run on a collection of buggy applications -LSB- 36 -RSB- . The study was approved by the Virginia Tech Institutional Review Board -LRB- IRB -RRB- -RRB- -RRB- -RRB- 2017 . The study was approved by the Virginia Tech Institutional Review Board -LRB- -LRB- IRB 2017 . The study was approved by the Virginia Tech Institutional Review Review -LRB- -LRB- IRB IRB IRB IRB IRB IRB IRB IRB and [UNK] [UNK] . The study was created by the Virginia Tech Institutional Review Review . The study found the performance of the cost of dynamic program analysis . The effectiveness evaluation assesses the bug detection . The an instrument of evaluation we performed a user study on the students enrolled in Computer Systems in Spring 2017 .

PG: CNN_DailyMail E2: the deadlock detection only shows the line number where the threads deadlock . In regards to ValgrindPlus , more work is needed to support atomic variables . More research is required to determine how to detect atomic variables at the machines code level . None

PG: WikiAll E1: [UNK] is a tool used by computer programmers to measure the detection of atomic variables at the machines code level . It is based on the premise that deadlock detection can be applied to deadlock detection . It is based on the premise that deadlock detection is the problem of finding atomic variables at the machines code level .

PG: WikiAll E2: [UNK] 7.1 Future Work is a [UNK] research research program that aims to improve the quality of atomic variables . It is based on the premise that the user study caused the exact acquisition of atomic variables at the machines code level . It is one of the world 's fastest [UNK] research tools . It is based on the premise that the user study of the atomic variables at the machines code level is needed to support atomic variables . It is an improvement to deadlock detection . In addition to ValgrindPlus , it is an improvement to deadlock detection .

PG: CNN_DailyMail+WikiThesis E1: Conclusion 7.1 Future Work research has demonstrated successful results in the user study . In research is required to determine how to detect atomic variables at the machines code level , especially for different memory consistencies . In research is required to determine how to detect atomic variables at the machines code level , especially for different memory consistencies .

PG: CNN_DailyMail+WikiThesis E2: In 7.1 Future Work This research is a user study of the deadlock detection of atomic variables at the machines code level . In research is required to determine how to detect atomic variables at the machines code level , especially for different memory consistencies . In an improvement to deadlock detection , Valgrind could track which locks are held to indicate the exact acquisition that caused the deadlock . In research is required to determine how to detect deadlock but should also provide help to debug it . As an improvement to deadlock detection , should not only detect deadlock but should support atomic variables .

PG: CNN_DailyMail+WikiAll E1: [UNK] 7.1 Future Work This research is a effective tool used to detect atomic variables at the machines code level , especially for different memory consistencies . In deadlock detection , Valgrind could track which locks are held to indicate the exact acquisition that caused the exact acquisition that caused the deadlock . In research is required to determine how to detect atomic variables at the machines code level , especially for different memory consistencies .

PG: CNN_DailyMail+WikiAll E2: [UNK] computer science , deadlock detection is a tool used to determine the acquisition of atomic variables at the machines code level . [UNK] deadlock detection can be seen as a result of the acquisition of atomic variables at the machines code level . [UNK] deadlock detection can be used to determine the acquisition of atomic variables at the machines code level . [UNK] research is required to determine how to detect atomic variables at the machines code level . [UNK] research is required to determine how to detect atomic variables . In research is required to determine how to detect atomic variables .

MOLINARO, N. J. The Two Point Correlation Structure of a Cylinder Wake. Thesis, Virginia Tech, June 2017. <http://hdl.handle.net/10919/78296>

Chapter 1

Gold standard summary: The two-point correlation structure and turbulence statistics of a cylinder wake are studied in order to develop accurate prediction methods for an open rotor ingesting turbulence. Understanding wake flow is necessary for understanding the noise produced by a wake generator. Proper Orthogonal Decomposition is used to determine the optimum velocity profile that describes the shape of structures in flow. Two-point correlation functions are used to infer the characteristic eddy structures in each wake using the proper orthogonal decomposition. Comparisons between cylinder structures and airfoil turbulent wake flows will give insight into how and why different inflow conditions produce different sound fields when an open rotor ingests wake flows. Related literature explains the physics of the plane wake including the flow behind a cylinder, universality and self-preservation, and measurements of a NACA 0012 airfoil (studied by Devenport).

PG: CNN_DailyMail E1: Introduction This thesis describes an experimental study of the two-point correlation structure of a cylinder center . These four-dimensional space-time correlation of the wake at the rotor disk location , measured without the rotor installed , provides the complete linear inflow boundary condition to this problem . The upwash velocity is the velocity perpendicular to the blades of a rotor disk , and its correlation function directly depends . None

PG: CNN_DailyMail E2: Introduction were performed on an untripped cylinder wake at a Reynolds number based on the cylinder diameter and freestream velocity of 60 000 . The majority of the measurements were performed in the mid-wake region 20 diameters downstream of the cylinder center . These major goal of the larger study is to develop more accurate prediction methods for an open rotor turbulence . None

PG: WikiAll E1: The cylinder wake flow -LRB- [UNK] -RRB- is a measure of the wake flow of a cylinder wake . It can be used to calculate the far field sound spectra of a cylinder wake .

PG: WikiAll E2: A circular cylinder is a type of wake flow in which the wake of a cylinder is used to measure the velocity fluctuations of an aircraft or aircraft . It is used to measure the velocity fluctuations of a wake flow in a wake of the wake of the wake of the wake of the wake of the wake of the wake of the cylinder wake . The wake of a wake flow is the wake of the wake of the wake of the wake of the wake of the wake of the cylinder wake . The cylinder wake can be caused by a wake of the wake of the wake of the wake of the cylinder wake .

PG: CNN_DailyMail+WikiThesis E1: The two-point time delay correlation function is also important in the larger study because the broadband noise generated by a rotor blade can be broken down into predictions of the noise generated by individual characteristic eddies of the flow .

PG: CNN_DailyMail+WikiThesis E2: [UNK] is a study of the two-point correlation structure of a cylinder wake at a Reynolds number based on the cylinder diameter and freestream velocity of 60 000 . The majority of the measurements were performed in the mid-wake region 20 diameters downstream of the cylinder center . The measurements were made to provide the inflow boundary condition to a larger study because it can be used to calculate the dominate eddy structures present in a flow . The comparisons between the cylinder and airfoil wake data sets show some similarities , but also some significant differences between the structures of the undisturbed cylinder wake in terms of its turbulence statistics and two-point time delay correlation .

PG: CNN_DailyMail+WikiAll E1: [UNK] [UNK] [UNK] [UNK] [UNK] -RRB- is a study of the two-point correlation structure of a cylinder wake . [UNK] is a [UNK] time delay correlation function of the far field sound spectrum generated by a rotor ingesting turbulence . The measurements were performed in the mid-wake region 20 diameters downstream of the mid-wake region 20 diameters downstream of the cylinder center .

PG: CNN_DailyMail+WikiAll E2: [UNK] turbulence is a study of the two-point correlation structure of a cylinder wake at a Reynolds number based on the 50 cm wind tunnel test . The study was developed by [UNK] [UNK] and [UNK] [UNK] in the [UNK] [UNK] of the [UNK] [UNK] [UNK] [UNK] [UNK] -RRB- . [UNK] was developed by [UNK] [UNK] and [UNK] [UNK] in the [UNK] [UNK] of [UNK] [UNK] [UNK] [UNK] -RRB- . [UNK] was developed by [UNK] [UNK] and [UNK] [UNK] in the [UNK] [UNK] of [UNK] [UNK] [UNK] [UNK] -RRB- . [UNK] was developed by [UNK] [UNK] and [UNK] [UNK] in the [UNK] [UNK] of [UNK] [UNK] .

MOLINARO, N. J. The Two Point Correlation Structure of a Cylinder Wake. Thesis, Virginia Tech, June 2017. <http://hdl.handle.net/10919/78296>

Chapter 2

Gold standard summary: Measurement data was collected at the Virginia Tech Stability Wind Tunnel and the Virginia Tech Open Circuit Wind Tunnel. The first facility is unique in that it can be acoustically quiet without distorting the aerodynamics of the air flow. The model used to generate the wake under investigation in the present study was a machined aluminum circular cylinder with a smooth, near polished surface finish. A computer controlled three-dimensional traverse was used to position probes in the wake of the cylinder to measure wake profiles. The traverses are operated using Matlab code that sets the rake to a desired height in the test section and samples the pressure probes on the rake using an Esterline scanner.

PG: CNN_DailyMail E1: Experimental facility is a closed-loop subsonic wind tunnel with a maximum flow velocity of 80 m/s in the test section with no blockage . This facility is a closed-loop wind tunnel with a maximum flow velocity of 80 m/s in the test section with no blockage . None

PG: CNN_DailyMail E2: The wind tunnel has freestream turbulence intensities of 0.021 and 0.031 at 21 and 57 respectively . The turbulence intensities were measured for flow velocities between 12 and 57 in 2006 by facility personnel . The air exchange tower the flow enters a 5.5-meter square settling chamber which contains 7 turbulence reduction screens . None

PG: WikiAll E1: The Virginia Tech Stability Wind Tunnel , also known as the Virginia Tech Stability Wind Tunnel , is a wind tunnel facility located in Virginia , Virginia , United States . Built in 2006 , it is one of the Virginia Tech Stability Wind Tunnel .

PG: WikiAll E2: The Virginia Tech Stability Wind Tunnel is a wind tunnel in Virginia , United States , operated by the Virginia Tech Stability Wind Tunnel . The facility is operated by the Virginia Tech Stability Wind Tunnel -LRB- [UNK] -RRB- . The facility is located at [UNK] [UNK] Drive in [UNK] , Virginia . The wind tunnel is operated by the Virginia Tech Stability Wind Tunnel . The facility is operated by the Virginia Tech Stability Wind Tunnel . The facility is operated by the Virginia Tech Stability Wind Tunnel . The facility is operated by the Virginia Tech Stability Wind Tunnel .

PG: CNN_DailyMail+WikiThesis E1: The wind tunnel is powered by a square cross section of 1.83 meters with a length of 7.3 meters . wind tunnel is powered by a square cross section of 1.83 meters with a length of 7.3 meters . wind tunnel is powered by a square cross section of 1.83 meters with a length of 7.3 meters .

PG: CNN_DailyMail+WikiThesis E2: The wind tunnel is a [UNK] test section of the test section of the test section . The wind tunnel has two interchangeable test sections to accommodate both types of testing . The turbulence intensities were measured for flow velocities between 12 and 57 in 2006 by facility personnel . The test section used for acoustic testing has a square cross section of 1.83 meters with a length of 7.3 meters . The cylinder was a machined aluminum tube with an inner diameter of 38.1 mm . The insert was slid into the inner diameter of the hollow center of the cylinder and anchored to a slot cut from the end of the cylinder .

PG: CNN_DailyMail+WikiAll E1: [UNK] wind tunnel is a wind tunnel in which the wind tunnel is shown below in the test section . The wind tunnel is shown below in the test section with no blockage . The wind tunnel is shown below in the test section with no blockage .

PG: CNN_DailyMail+WikiAll E2: The wind tunnel is a wind tunnel with a maximum flow velocity of 80 m/s in the test section of the test section . The wind tunnel is powered by a 0.45 MW variable speed DC motor . The wind tunnel is acoustically quiet without distorting the aerodynamics of the flow . The wind tunnel is controlled by a custom Emerson VIP ES-6000 SCR Drive which was designed to limit unsteadiness from the motor . The motor is controlled by the wind tunnel facility and test setup . The facility is anechoic down to 180 Hz -LRB- Devenport et al. , 2013 -RRB- .

MOLINARO, N. J. The Two Point Correlation Structure of a Cylinder Wake. Thesis, Virginia Tech, June 2017. <http://hdl.handle.net/10919/78296>

Chapter 3

Gold standard summary: The two-dimensionality of the cylinder wake was determined to be acceptable at both test locations and the normalized wakes were judged to be similar. More measurements were made in the open circuit wind tunnel than the stability wind tunnel; these were followed by shifting the measurement grid data, correcting for the angle sensitivity of the hotwire probes, and studying hotwire probe coherence. The two-point time delay correlation depends on three spatial coordinates, so quad-hotwire probes were used to measure the three components of velocity in each flow. The full measurement campaign consisted of 19 independent measurements, where each measurement had a unique fixed probe position. Cylinder wake flow was shown to be substantially more turbulent than the airfoil wake flow, while supporting a very similar mean flow. The two-point correlations showed that structures in the cylinder wake remain coherent to longer time delays and probe separations than those present in the airfoil wake. This suggests that an open rotor ingesting the cylinder wake will produce a very different sound profile than a rotor ingesting an airfoil wake.

PG: CNN_DailyMail E1: Results Stability Wind Tunnel Tunnel Tunnel Tunnel Tunnel Tunnel Tunnel Tunnel Summary Summary The The The The The The The The The The The The The The The . they were used to compare with the results from the two-point measurement performed in a separate facility . Wake cross sections using the Pitot and Pitot static pressure probes on the rake . None

PG: CNN_DailyMail E2: Stability point statistics and spectra were used to compare with the results from the two-point measurement performed in a separate facility . Wake cross sections were measured 10 , 15 and 20 diameters downstream of the cylinder center . The are due to interactions from the boundary layers of the floor and ceiling of the test section . None

PG: WikiAll E1: The Stability Wind Tunnel -LRB- [UNK] -RRB- is a test section of the Stability Wind Tunnel -LRB- streamwise -RRB- . It is a part of the Stability Wind Tunnel -LRB- streamwise -RRB- . It is a part of the Stability Wind Tunnel -LRB- streamwise -RRB- , and is a part of the Stability Wind Tunnel -LRB- streamwise -RRB- . It is one of the world 's most successful research tools in the Stability Wind Tunnel -LRB- streamwise -RRB- , and is a part of the Stability Wind Tunnel -LRB- streamwise -RRB- .

PG: WikiAll E2: The Stability Wind Tunnel -LRB- rake -RRB- is a measure of the Stability Wind Tunnel in the Stability Wind Tunnel and the Open Circuit Facility of the United States Department of Defense . The Stability Wind Tunnel -LRB- [UNK] -RRB- was the first measurements performed in the Stability Wind Tunnel in the Stability Wind Tunnel . The Stability Wind Tunnel was named for the Stability Wind Tunnel in the Stability Wind Tunnel at the University of California , United States . The Stability Wind Tunnel -LRB- [UNK] -RRB- was a measure of the Stability Wind Tunnel in the Stability Wind Tunnel -LRB- [UNK] -RRB- . The Stability Wind Tunnel was named for the Stability Wind Tunnel in the Stability Wind Tunnel .

PG: CNN_DailyMail+WikiThesis E1: [UNK] point wake profiles were extracted from the cross section of the cylinder center . [UNK] cross sections were used to compare with the results from the start of the start of the start of the test section .

PG: CNN_DailyMail+WikiThesis E2: [UNK] stress profiles of the wake of the wake of the wake of the wake of the [UNK] . [UNK] stress profiles are [UNK] meters from the start of the test section with the wake rake 20 diameters downstream of the cylinder center of the cylinder center . The scales were computed using the mean velocity profiles measured during a single run with the wake rake without the fences installed . The cylinder wake was measured for a freestream velocity of 20 m/s at stations 20 , 15 and 10 diameters downstream of the cylinder center at the same streamwise station with the boundary layer fences installed . The fences improved the lobes seen near the ends of the cylinder near $\pm =$ inches along the cylinder span .

PG: CNN_DailyMail+WikiAll E1: [UNK] [UNK] [UNK] [UNK] [UNK] [UNK] [UNK] is a [UNK] [UNK] [UNK] [UNK] [UNK] [UNK] [UNK] [UNK] [UNK] [UNK] [UNK] [UNK] [UNK] [UNK] [UNK] [UNK] [UNK] [UNK] . [UNK] was developed by [UNK] [UNK] and [UNK] [UNK] in the [UNK] [UNK] of [UNK] .

PG: WikiAll E2: The Stability Wind Tunnel -LRB- [UNK] -RRB- is a measure of acoustic prediction in the United States and Canada . It was developed by the Virginia Tech Open Circuit Wind Tunnel at the Stability Wind Tunnel in the United States . It was the first study of acoustic prediction in the Stability Wind Tunnel in the United States . It was named after the Stability Wind Tunnel at the University of Pittsburgh , United States . It was named after the Virginia Tech Open Circuit Wind Tunnel . It was named after the [UNK] of the [UNK] [UNK] [UNK] [UNK] [UNK] [UNK] -LRB- [UNK] -RRB- .

PG: CNN_DailyMail+WikiThesis E1: [UNK] two-point correlation serves as the complete boundary condition for the larger study . The point measurements took place at a location in the mid-wake region 20 diameters downstream of the cylinder center . The point measurements took place at a location in the mid-wake region 20 diameters downstream of the cylinder center .

PG: CNN_DailyMail+WikiThesis E2: [UNK] correlation function of the first four modes in the cylinder wake show that the cylinder wake is substantially more turbulent than the airfoil wake . The correlation function in the cylinder wake was further processed using proper orthogonal decomposition to give insight into the eddy structure of the cylinder wake show that the cylinder wake has substantially higher correlation values than seen in the wake of a NACA 0012 airfoil completed by . The cylinder wake has been organized into a single Matlab data file such that it can easily be cut more times by successive blades when pulled into a rotor , generating more sound . The investigation is needed to assess how these differences in the flow structures will influence the predicted sound profiles computed using the cylinder .

PG: CNN_DailyMail+WikiAll E1: [UNK] [UNK] [UNK] [UNK] [UNK] Tunnel Tunnel is a study of the two-point correlation structure of a cylinder wake . [UNK] is a [UNK] correlation function of the cylinder wake of the wake of the wake of the wake of a NACA 0012 airfoil . The correlation function of the cylinder has been reduced to a form that can be used as the complete boundary condition for this problem . The two-point correlation function in the cylinder wake is not out of the scope of the work completed by other authors .

PG: CNN_DailyMail+WikiAll E2: The cylinder wake correlation is a study of the two-point correlation structure of a cylinder wake . The correlation function of the cylinder has been reduced to a form that can be used as the input condition for existing acoustic prediction methods . The two-point correlation serves as the complete boundary condition for existing acoustic prediction methods . The cylinder wake is substantially more turbulent than the scope of the work completed by other authors . The cylinder wake has substantially higher correlation values than seen in the cylinder wake show that the cylinder wake did have a nonzero velocity profile in two different facilities , great care was taken to ensure that the mean velocity , Reynolds stress profiles and the two-point correlation would accurately represent the complete boundary condition for the larger study . The cylinder wake was further processed using proper orthogonal decomposition to give insight into the eddy structure of the cylinder wake .

DELLINGER, E. A. "The Pattern is Movement": Images of Timelessness and Patterns of Response in T.S. Eliot's Four Quartets. Thesis, Virginia Tech, June 2017. <http://hdl.handle.net/10919/78299>

Chapter 1

Gold standard summary: T.S. Eliot's poem 'Burnt Norton and Reflected Light' which originated from his 1934 visit to an old and burned manor house, explores temporal existence and the search for a meaning, sensed but not understood, outside the boundaries of human finitude, through the lens of motion, both linear and non-linear. Initially, the notion that the mind is capable of viewing time with perpetual possibilities is discussed - the idea of 'what could have happened'. Then, ways to escape linear time after exile from the rose garden are illustrated, into the outside world that has been entrapped by time. The poem then descends into a different realm - using the analogy of an underground metro that is dimly lit and aims to create a contrast between the previously explored shadowy unreality of "time-ridden" lives. Further, the poem talks about returning back to the surface, but a black cloud carries the sun away. The transience of words and music (which are also in motion) is also illustrated. Through a set of images, Eliot guides the reader into the beginning of a search for visions of reality's light.

<p>PG: CNN_DailyMail E1: Burnt Norton , remembered or imagined , bend the linear nature of time in the mind . These existences , remembered or imagined , bend the linear nature of time in the mind . These existences , remembered or imagined , bend the linear nature of time in the mind . None</p>
<p>PG: CNN_DailyMail E2: Burnt Norton and Reflected Light I first ten lines of Part I meditate on the interrelated nature of the different aspects of time . It is ruled by the divisions of the present and before and after . None</p>
<p>PG: WikiAll E1: Chapter 1 : Burnt Norton and Reflected Light Part I meditate Norton and Reflected Norton and</p>
<p>PG: WikiAll E2: Burnt Norton -LRB- also known as Burnt Norton -RRB- is one of the oldest in the world in the world . It is one of the world 's most famous examples of [UNK] . It is one of the world 's most famous examples of “ [UNK] Norton ” and “ [UNK] Norton ” . Burnt Norton is one of the world 's most famous examples of “ [UNK] ” and “ [UNK] Norton ” . It is one of the world 's most famous examples of “ [UNK] Norton ” -LRB- “ [UNK] [UNK] ” -RRB- and “ [UNK] [UNK] ” -LRB- “ [UNK] [UNK] ” -RRB- .</p>
<p>PG: CNN_DailyMail+WikiThesis E1: [UNK] Norton is a poem of the listener 's words echo in the mind of the listener 's mind , But to what purpose Disturbing the dust on a bowl of rose-leaves I do not know . The echo is a reflection of sound waves , repeated to the listener as they bounce off of a surface .</p>
<p>PG: CNN_DailyMail+WikiThesis E2: [UNK] is a garden of the garden of the rose garden of the rose garden of the rose garden of the rose garden of the rose garden of the rose garden of the rose garden of the rose garden of the manor house in the early 1960s . [UNK] garden is the first abode of humankind . The garden is a world where reality shifts , where “ what might have been , ” for all of humanity . “ our first world ” brings to mind the Garden of Eden , by disturbing the dust through echoes of an existence that “ might have been , ” he says .</p>

PG: CNN_DailyMail+WikiAll E1: [UNK] [UNK] non-memory is a [UNK] poem written by [UNK] [UNK] and published by [UNK] [UNK] and published by [UNK] [UNK] and published in 1985 . [UNK] book was published on [UNK] 19 , 2011 .

PG: CNN_DailyMail+WikiAll E2: [UNK] 1 : Burnt 1 is a [UNK] [UNK] [UNK] [UNK] [UNK] of the [UNK] [UNK] of the [UNK] [UNK] of [UNK] at the [UNK] of [UNK] , [UNK] [UNK] , and [UNK] [UNK] .

DELLINGER, E. A. "The Pattern is Movement": Images of Timelessness and Patterns of Response in T.S. Eliot's Four Quartets. Thesis, Virginia Tech, June 2017. <http://hdl.handle.net/10919/78299>

Chapter 2

Gold standard summary: T.S. Eliot's second poem of the Four Quartets is 'East Coker and the Dance'. While 'Burnt Norton' gives a glimpse outside the linear veneer of time, it presents the problem, of making time stretch before and after, seem to be a waste of time. This poem, East Coker, responds to the problem by delving into this expanse of time before and after, probing into the ridiculousness and seeming endlessness of human limitation in the face of such a moment of vision. It further questions whether existence in time negates the potential of meaningfulness. This question is explored using the image of a dance, which gracefully ties together the motion of time and the stillness of waiting into the search for meaning. Thus, what seems like an end, is a part of the dance, and therefore a beginning.

PG: CNN_DailyMail E1: The scene in the lane is characterized by a slowness and pervasive quietness . The scene in the lane is characterized by a slowness and pervasive quietness that seems to subdue thought . The scene in the lane is characterized by a slowness and pervasive quietness that feels like enchantment or a dream . None

PG: CNN_DailyMail E2: the village of Somerset , from which his ancestors originated before emigrating to the New World in 1669 -LRB- Gardner , Composition 42 -RRB- . The this beginning , he also sees an end ; in the changing of the village across the succession of generations appears the endless cyclicity of life , of its perpetual beginnings and ends . the poem “ contrasts with these cycles and ages a single day ; sets against the inevitabilities of the seasons and of historic change the erratic movements of psychological and mental time ” None

PG: WikiAll E1: The pervasive somberness -LRB- “ [UNK] [UNK] ” -RRB- , also known as “ [UNK] [UNK] ” , is one of the “ [UNK] [UNK] ” -LRB- “ [UNK] [UNK] ” -RRB- . It is a part of the family of [UNK] . It is one of the oldest [UNK] in the world . It is one of the world ’s largest [UNK] in the world . It is one of the world ’s largest [UNK] in the world .

PG: WikiAll E2: The [UNK] of the Governour -LRB- Gardner , Composition 42 -RRB- is a poem by [UNK] Eliot , first published in “ [UNK] [UNK] ” in 1970 . It is a part of the Gardner , Gardner , Composition 42 , and Dance Part I . It is a [UNK] and [UNK] stillness . The poem was published by [UNK] [UNK] in his book “ Composition of [UNK] ” -LRB- [UNK] -RRB- . It is also known as “ [UNK] [UNK] ” , “ [UNK] [UNK] ” , “ [UNK] [UNK] ” , “ [UNK] [UNK] ” , “ [UNK] [UNK] ” , “ [UNK] [UNK] ” , and “ [UNK] [UNK] ” .

PG: CNN_DailyMail+WikiThesis E1: The Coker is a village of Somerset in the village of Somerset . the village of Somerset , from which his ancestors originated before emigrating to the village of Somerset , also sees an end in the changing of the succession of generations .

PG: CNN_DailyMail+WikiThesis E2: “ The and death ” is one of the world ’s most successful forms of dance . [UNK] is a symbol of the “ [UNK] ” of the [UNK] of the world . “ [UNK] ” is a [UNK] [UNK] of the dance and [UNK] of the dance . “ [UNK] and death ” may be “ [UNK] ” and “ [UNK] ” and “ [UNK] ” and “ [UNK] ” , “ [UNK] ” , “ [UNK] ” , “ [UNK] ” , “ [UNK] ” , “ [UNK] ” , “ [UNK] ” , “ [UNK] ” , “ [UNK] ” , “ [UNK] ” , “ [UNK] ” , “ [UNK] ” , “ [UNK] ” , “ [UNK] ” , “ [UNK] ” , “ [UNK] ” , “ [UNK] ” , “ [UNK] ” , “ [UNK] ” , “ [UNK] ” and “ [UNK] ”

PG: CNN_DailyMail+WikiAll E1: [UNK] [UNK] of the [UNK] , [UNK] [UNK] [UNK] , [UNK] 42 , [UNK] [UNK] , [UNK] -RRB- was a [UNK] poet and poet .

PG: WikiAll E1: The Dry Salvages -LRB- “ [UNK] [UNK] ” -RRB- , also known as the Dry Salvages , is a river in the [UNK] region of Western Australia . It is a tributary of the Dry Salvages . It is one of the largest [UNK] in North America .

PG: WikiAll E2: The silent fog , also known as the silent fog , is a river in the winter gaslight , in the nursery bedroom of the coast of Western Australia . It is one of the most famous examples of the river , and is one of the most common [UNK] in the world . The river is one of the [UNK] of the fir trees , and is one of the most prominent [UNK] in the world . The river is one of the [UNK] of the “ [UNK] [UNK] ” . The river is one of the [UNK] of the “ [UNK] [UNK] ” .

PG: CNN_DailyMail+WikiThesis E1: [UNK] Dry is a [UNK] river in the [UNK] [UNK] of [UNK] , [UNK] . [UNK] is the first of the world ’s most successful river in the world . the river is later subsumed by city and no longer recognized as a frontier , it is within us .

PG: CNN_DailyMail+WikiThesis E2: [UNK] is a river in the family of the genus “ [UNK] ” and “ [UNK] ” , “ the horseshoe crab ” and “ the whale ’s backbone ” , “ the salt is on the briar rose ” , “ the salt is on the briar rose ” , “ the land ’s edge ” the river is later subsumed by city and no longer recognized as a frontier , it is still present and powerful . “ hints ” are traces of a vast natural world that appears as pieces of a world mysterious and other to us .

PG: CNN_DailyMail+WikiAll E1: [UNK] is a branch of river in the [UNK] [UNK] of the [UNK] [UNK] of the [UNK] [UNK] of [UNK] . [UNK] is one of the [UNK] [UNK] of the [UNK] [UNK] of the [UNK] [UNK] .

PG: CNN_DailyMail+WikiAll E2: [UNK] was a [UNK] [UNK] river in the [UNK] [UNK] of the [UNK] [UNK] of the [UNK] [UNK] of the [UNK] [UNK] of the [UNK] [UNK] of the [UNK] [UNK] of the [UNK] [UNK] of the [UNK] [UNK] of [UNK] [UNK] . [UNK] is a [UNK] of the [UNK] [UNK] of the [UNK] [UNK] of the [UNK] [UNK] of [UNK] [UNK] and [UNK] [UNK] of the [UNK] of [UNK] [UNK] .

PG: WikiAll E1: Little Gidding and Transforming Fire Part I , also known as Little Gidding , is a type of paradoxical combination of “ frost and fire ” . It is one of the most widely used in the United States in the United States .

PG: WikiAll E2: Burnt Norton ’s rose garden -LRB- “ [UNK] Norton ” -RRB- is a short day of midwinter spring . It was first published in “ [UNK] [UNK] ” in 1969 . It is based on the concept of “ approach to meaning ” -LRB- Art 178 -RRB- . It is considered to be one of the [UNK] of the “ [UNK] [UNK] ” of the “ [UNK] [UNK] ” -LRB- [UNK] -RRB- . It is considered to be one of the [UNK] of the “ [UNK] [UNK] ” of the “ [UNK] [UNK] ” -LRB- [UNK] -RRB- . It is considered to be one of the [UNK] of the “ [UNK] [UNK] ” .

PG: CNN_DailyMail+WikiThesis E1: “ midwinter spring ” opens up an interval within the short day of midwinter spring . The paradoxical combination of “ frost and fire ” becomes real in the brightness of the short day of midwinter spring , as ice appears in flame so intense that it is blinding . The paradoxical combination of “ frost and fire ” becomes real in the brightness of the short day of midwinter spring .

PG: CNN_DailyMail+WikiThesis E2: “ the end of the journey ” is one of the most successful poems of the year . “ the end of the journey ” is the backdrop for the passing of time . “ the purpose is beyond the end you figured , ” the marker of human finitude says . “ if you came by day not knowing what you came for , ” the result “ would be the same , ” “ the end you figured And is altered in fulfillment , ” the marker of the defeated King Charles to the church of Little Gidding -LRB- Gardner , Composition 62 -RRB- , or “ if you came at night like a broken king ”

PG: CNN_DailyMail+WikiAll E1: [UNK] [UNK] and Transforming Fire Part I Gidding Gidding is a [UNK] fire in the [UNK] [UNK] of the [UNK] [UNK] of the [UNK] [UNK] of the [UNK] [UNK] of East Coker . [UNK] was first described by [UNK] [UNK] and [UNK] [UNK] in 1965 .

PG: CNN_DailyMail+WikiAll E2: [UNK] Norton ’s rose garden is a [UNK] in the [UNK] [UNK] of the [UNK] [UNK] of the [UNK] [UNK] of the [UNK] [UNK] of the [UNK] [UNK] of the [UNK] [UNK] of the [UNK] [UNK] of the [UNK] and [UNK] [UNK] of the [UNK] [UNK] of the [UNK] and [UNK] [UNK] of the 19th century . [UNK] is a member of the [UNK] [UNK] [UNK] of the [UNK] [UNK] of the [UNK] and [UNK] [UNK] of the [UNK] and [UNK] [UNK] at the [UNK] [UNK] of [UNK] [UNK] . [UNK] is a member of the [UNK] [UNK] [UNK] of the [UNK] and [UNK] [UNK] of the [UNK] and [UNK] [UNK] .

ROTH, H. M. Smartphone Privacy in Citizen Science. Thesis, Virginia Tech, July 2017.
<http://hdl.handle.net/10919/78360>

Chapter 1

Gold standard summary: Privacy concerns influence acceptance of citizen science, which relates to crowdsourcing, crowdsensing, and groupsensing. This study discusses a potential solution to privacy concerns in Android devices, i.e., a cryptographic group signature scheme. A group sensing prototype GROUPENSE was developed which supports anonymous-yet-accountable crowdsensing in Android devices. A user study was conducted to improve the application, evaluating usability, understanding of the privacy guarantees of group signatures, and whether those would alleviate privacy concerns among citizen science participants.

PG: CNN_DailyMail E1: process of eliciting data collection from the general public . Regardless of the project scale , privacy concerns are likely to moderate . Regardless of the project scale , privacy concerns are likely to moderate the acceptance and viability of citizen science . Regardless of the project scale , privacy concerns are likely to moderate the acceptance and viability of citizen science . None

PG: CNN_DailyMail E2: Introduction In order to have a clear understanding of this paper , a few key terms are defined as follows : 1 . the process of eliciting data collection from the general public . the process of eliciting data collection from devices or sensors . None

PG: WikiAll E1: A deterministic group signature -LRB- [UNK] -RRB- is a type of cryptographic solution that can be used to create a digital signature such as a digital signature or a digital signature . It is a type of cryptographic solution that can be used to create a digital signature .

PG: CNN_DailyMail+WikiAll E2: [UNK] privacy is a type of cryptographic solution that allows sensory data to be sent anonymously -LSB- 61 -RSB- . [UNK] solution is an innovative group signature scheme that promotes an improved quality of data resources and increased discovery . This is a critical barrier to the effective deployment of privacy preserving infrastructure . [UNK] a result , people are likely to trade off their long-term privacy for short-term benefits -LSB- 3 -RSB- . [UNK] a result , people are likely to trade off their long-term privacy for short-term benefits -LSB- 3 -RSB- . [UNK] a result , people are protected against privacy threats and vulnerabilities .

ROTH, H. M. Smartphone Privacy in Citizen Science. Thesis, Virginia Tech, July 2017. <http://hdl.handle.net/10919/78360>

Chapter 2

Gold standard summary: Related work and background issues are discussed about crowdsensing platforms, group signatures, threat models, security and privacy goals, and Android mobile computing. Crowdsensing platforms include various architecture components, like group manager, data collector, data obfuscator, MIX network, sensors, and data collection server. They support particular operations like recruitment, task assignment, data submission, revocation, and reward distribution. Using group signature scheme, platform supports anonymous-yet-accountable group sensing. Under threat model, three categories of threats, Data forgery, Identity forgery Honest data collector are identified and addressed through three security and privacy goals, Accountability, Identity Unforgeability, and Sensing-time Anonymity. Android mobile computing discussed the advantage of Crowdsensing in terms of being cost-effective, perpetuate possibilities of tracking and highlighted the significance of adherence to a systematic and disciplined approach to user security.

PG: CNN_DailyMail E1: Background 2.1 Crowdsensing Platform The new urban-scale crowdsensing vision promises useful applications , such as health mon . However , an open crowdsensing platform where anyone can submit data is undesirable as a portal for trans - ferring sensitive data . None

PG: CNN_DailyMail E2: Background open platform where anyone can submit data is undesirable as a portal for transferring sensitive data . An constitutes a vulnerability which threatens privacy , data integrity , and reliability standards -LSB- 56 -RSB- . While accountability protects the data collector , the vast number of crowdsensing participants need to be protected against privacy threats and vulnerabilities -LSB- 31 -RSB- .
None

PG: WikiAll E1: [UNK] anonymity is a type of [UNK] vision . It is based on the premise that data is undesirable as a portal for anonymity . It is based on the premise that data is undesirable as a portal for anonymity .

PG: CNN_DailyMail+WikiThesis E1: [UNK] anonymity is a vulnerability that threatens privacy, data integrity, and reliability standards. The cryptographic solutions are not specifically designed for this paradoxical requirement type already exist.

PG: CNN_DailyMail+WikiThesis E2: [UNK] is a group of signature schemes that uses group signatures for sensory data submission. [UNK] group manager can access blinded and discrete identifiable information to link compensation or revocation back to the participant. The group manager can anonymously sign data to a curious data collection server - the signature does not support membership revocation, resulting in a low account - solely verifies membership. The group manager can access blinded and discrete identifiable information to link compensation. This is a [UNK] crowdsensing framework that uses group signatures for setting up pseudonyms, but resorts to the public-key certification approach for data.

PG: CNN_DailyMail+WikiAll E1: [UNK] 2.1 Crowdsensing Platform vision is a vulnerability that threatens privacy, data integrity, and reliability standards, and traffic prediction. This constitutes a vulnerability which threatens privacy, data integrity, and reliability standards. This constitutes a vulnerability which threatens privacy, data integrity, and reliability standards. This constitutes a vulnerability which threatens privacy, data integrity, and reliability standards.

PG: CNN_DailyMail+WikiAll E2: [UNK] anonymity is a type of group signature schemes that are used to track and submit data to the data collector. [UNK] is a type of security requirement that allows for a single public key to malicious and erroneous participation. [UNK] anonymity is an essential security requirement for those participants who are involved in long-term crowdsensing campaigns. The adoption of sensing-time anonymity is an essential security requirement, especially for those participants who attempt to track and identify participants, as well as data breaches on the data-collection servers.

ROTH, H. M. Smartphone Privacy in Citizen Science. Thesis, Virginia Tech, July 2017. <http://hdl.handle.net/10919/78360>

Chapter 3

Gold standard summary: An in-person user study had 22 student participants working with an Android device for 15 minutes using a crowdsensing application, in addition to other use of the device for usual and customary activities. After the user study, a survey gathered demographic information (age, gender, technical background) and had 7 questions (with quantitative responses plus optional comments) about privacy concerns, citizen science, and features of the Android application. It is suggested that participants generally view privacy as important; 82 of participants were willing to install the application on their smartphone.

PG: CNN_DailyMail E1: Study studies can be conducted either through physical, remote, or even crowdsourcing mechanisms -LRB-. An studies can be conducted either through physical, remote, or even crowdsourcing mechanisms -LRB-. An studies can be conducted either through physical, remote, or even crowdsourcing mechanisms -LRB-. None

PG: CNN_DailyMail E2: User studies can be conducted either through physical, remote, or even crowdsourcing mechanisms -LRB- such as Amazon's Mechanical Turk -LSB- 44 -RSB- -RRB-. Participants participant received a detailed explanation of the study objective and was then asked to use the Android device that contained the crowdsensing application for fifteen minutes. The participants were encouraged to use the device during this period for usual and customary activities. None

PG: WikiAll E1: User Study Design User studies -LRB- also known as [UNK] -RRB- is a technique used to measure the usability of the evaluation process. It is used to measure the evaluation of the usability of the Android device. It is administered by the Department of Computer Science at the University of Pittsburgh.

<p>PG: WikiAll E2: The User Study 3.1 Study Design Board is a United States Department of User Study -LRB- [UNK] -RRB- program that was funded by the Institutional Review Board -LRB- IRB -RRB- . It was developed by [UNK] [UNK] and published by [UNK] [UNK] . The results were published in the United States by the Institutional Review Board -LRB- [UNK] -RRB- , and the “ [UNK] [UNK] [UNK] ” -LRB- [UNK] -RRB- . The results were published in the United States by the Association for the Advancement of Science -LRB- [UNK] -RRB- . The survey was first published in the United States on February 26 , 2008 .</p>
<p>PG: CNN_DailyMail+WikiThesis E1: User 3.1 Study 3.1 Study 3.1 Study 3.1 Study 3.1 Study 3.1 Study 3.1 Study 3.1 Study 3.1 Study 3.1 Study 3.1 Study 3.1 Study 3.1 Study 3.1 Study 3.1 Study 3.1 Study .</p>
<p>PG: CNN_DailyMail+WikiThesis E2: [UNK] Study 3.1 Study Design studies are essential catalysts to the evaluation process by eliciting and disseminating feedback from potential consumers . These studies can be conducted either through physi - cal , remote , or even crowdsourcing mechanisms -LRB- such as Amazon ’s Mechanical Turk -LSB- 44 -RSB- -RRB- . The participants were encouraged to use the device during this period for usual and customary activities , including but not limited to surfing the web , listening to music , watching videos , searching the map , and taking pictures . participants were instructed not to enter any sensitive information into the device .</p>
<p>PG: CNN_DailyMail+WikiAll E1: [UNK] 3.1 Study 3.1 Study Design User -RRB- is a [UNK] [UNK] [UNK] [UNK] [UNK] [UNK] [UNK] [UNK] [UNK] [UNK] [UNK] [UNK] [UNK] [UNK] [UNK] [UNK] [UNK] [UNK] [UNK] . [UNK] was founded in 1998 by [UNK] [UNK] and [UNK] [UNK] .</p>
<p>PG: CNN_DailyMail+WikiAll E2: [UNK] [UNK] 3.1 Study Design User -RRB- is a study of the evaluation process by eliciting and disseminating feedback from potential consumers . [UNK] studies are essential catalysts to the evaluation process by eliciting and disseminating feedback from potential consumers . [UNK] studies are conducted in person to evaluate the usability of our privacy-preserving crowdsensing application . The studies are conducted in person to provide feedback on the existing application . The addition , each participant was given an IRB approved survey to provide feedback on the existing application . The results show that almost 60 of participants chose “ Yes ” for this question . The results show that almost 60 of participants chose “ Yes ” for this question .</p>

ROTH, H. M. Smartphone Privacy in Citizen Science. Thesis, Virginia Tech, July 2017. <http://hdl.handle.net/10919/78360>

Chapter 4

Gold standard summary: The Crowdsensing Android Application collects data from sensors including accelerometer, gravity, gyroscope, linear accelerometer, magnetometer, and rotation. The original interface showed battery life as well as sensing status (stopped, paused, sensing) and had related buttons. Building upon the user study, requirements, design, and implementation of a new user interface led to notifications and more button displays, indicating collecting, signing, or sending data to the data collector.

PG: CNN_DailyMail E1: Crowdsensing 4.1 What does the user clicks the “ Start Sensing ” button on the home page , the application starts collecting data on the sensors listed in Table 4.1 . the data is collected but not actually stored to the device . Col - lecting data on the audio sensor is also an option , but it was not operational . None

PG: CNN_DailyMail E2: the application starts collecting data on the sensors listed in Table 4.1 . the data is collected but not actually stored to the device . Col 15 min - utes , which is configurable to collection requirements . None

PG: WikiAll E1: [UNK] is a software development tool developed by Col for the purpose of [UNK] [UNK] -LRB- [UNK] -RRB- . The application is based on the application of the Android platform . The application is based on the application of the “ Start Sensing ” series . It was developed by [UNK] , [UNK] , and [UNK] .

PG: WikiAll E2: 4.3.3 Android Application 4.2.1 User Interface -LRB- crowdsensing -RRB- is one of the most widely used computers in the Android operating system . The application is based on the user interface of the original crowdsensing application . The application is based on the user interface of the user interface and the user interface of the application . The application is based on the user interface of the user interface and the user interface of the application . The application is based on the user interface of the user interface and the user interface of the application . The application is based on the concept of the “ Start Sensing ” . The application is based on the concept of the “ Start Sensing ” .

PG: CNN_DailyMail+WikiThesis E1: Crowdsensing data is a application of data on the sensors listed in Table 4.1 . This data on the audio sensor is also an option , but it was not operational . The data on the audio sensor is also an option , but it was not operational .

PG: CNN_DailyMail+WikiThesis E2: [UNK] data on the audio sensor is an option , but it was not operational . The data is collected but not actually stored to the device . After data on the audio sensor is also an option , but it was not operational . The user interface is currently collecting data on the sensors listed in Table 4.1 . The user interface is comprised of three text fields and two large buttons . This page consists of three text fields and two large buttons . This page consists of three text field notifies users of the current mode of the “ Start Sensing ” button .

PG: CNN_DailyMail+WikiAll E1: [UNK] Android Application 4.1 What is a [UNK] [UNK] [UNK] [UNK] [UNK] The The The The The The The The The The The The The The The The . [UNK] application was developed by [UNK] [UNK] and [UNK] [UNK] in the [UNK] [UNK] of [UNK] .

PG: CNN_DailyMail+WikiAll E2: [UNK] computer science , the Android Application 4.1 What is a software application for the [UNK] programming language developed by [UNK] [UNK] and [UNK] [UNK] . [UNK] was developed by [UNK] [UNK] [UNK] and [UNK] [UNK] [UNK] . [UNK] was developed by [UNK] [UNK] [UNK] and [UNK] [UNK] [UNK] [UNK] [UNK] . [UNK] was developed by [UNK] [UNK] [UNK] and [UNK] [UNK] [UNK] [UNK] [UNK] . [UNK] was developed by [UNK] [UNK] [UNK] and [UNK] [UNK] [UNK] [UNK] [UNK] [UNK] . [UNK] was developed by [UNK] [UNK] [UNK] and [UNK] [UNK] [UNK] [UNK] [UNK] [UNK] . [UNK] was developed by [UNK] [UNK] [UNK] and [UNK] [UNK] [UNK] [UNK] .

ROTH, H. M. Smartphone Privacy in Citizen Science. Thesis, Virginia Tech, July 2017. <http://hdl.handle.net/10919/78360>

Chapter 5

<p>Gold standard summary: GROUPESENSE, crowdsensing prototype with Android support, which elevates risks, limitations, and constraints associated with SRBE is proposed with the capability to expand to meet the needs of any group sensing application. It was developed and evaluated through a user study targeting whether the application, through its security features, obviates the privacy concern among participants. Based on findings, modifications were made to the application which includes additional screens and a sophisticated notification system. This work is significant with respect to security as it preserves the movement of provable secure group signatures closer to practical deployment. In future work, an additional user study is suggested with enhancements like a diversified group of respondents, with the difference in their scale and scope. In terms of Application Modifications, a performance boost, changes in the interface in form of a dashboard, financial exchange application, and identity management practices are suggested. It is also highlighted that large-scale crowdsensing applications require more focused efforts in security and privacy as existing privacy-preserving authentication protocols are inadequate.</p>
<p>PG: CNN_DailyMail E1: 5.1 Future Work 5.1 Future should be selected in order to order of achieve reliable measurement outcomes -LRB- i.e. free of confounding bias -RRB- . the application has a lengthy initial load time because keys are generated for signing purposes at startup . • Adding a dashboard for participants to view their history and outcomes . None</p>
<p>PG: CNN_DailyMail E2: study should be conducted on the revised application to measure the effectiveness and user response to the interface modifications and feature enhancements . the study should be extended to target potential predictors of user participation by analyzing how demographic information affects how a participant answers each question . First can be optimized by generating keys only once and reusing them by using caching techniques - storing them in the device 's memory . None</p>
<p>PG: WikiAll E1: [UNK] is a user study developed by the American Psychological Association -LRB- [UNK] -RRB- in the United States and Canada . It is based on the premise that the user study should be able to be able to achieve a reliable measurement of the effectiveness of the user study .</p>

PG: WikiAll E2: The Conclusion Future Work 5.1 Future Work is a prototype of [UNK] Future Work 5.1 Future Work -LRB- [UNK] -RRB- developed by [UNK] [UNK] . The application is based on the [UNK] Future Work 5.1 Future -LRB- [UNK] -RRB- project . The application is based on the user study of the user study . The application is based on the study of the user study and the study of the user study . The application is based on the study of mobile devices and is based on the study of mobile devices . The application is based on the concept of the user study .

PG: CNN_DailyMail+WikiThesis E1: Conclusion Future Work 5.1 Future Work 5.1.1 5.1.1 5.1.1 User User User User User User User User User User User User User User is a prototype that can be incorporated into three user study groups . This , the study sample would be stratified into three user study groups .

PG: CNN_DailyMail+WikiThesis E2: [UNK] is a follow-up user study of the first user study of three user study groups . [UNK] , the application has a lengthy initial load time because keys are generated for signing purposes at startup . The , the application has a lengthy initial load time because keys are generated for signing purposes at startup . The application should implement actual crowdsensing by storing the data collected onto the device to be signed and submitted to the data collector . In addition , the scope of the user study should be conducted on the revised application to measure the effectiveness and user response to the interface modifications and feature enhancements . The addition , the scope of the user study should be selected in order to achieve reliable measurement outcomes -LRB- i.e. free of confounding bias -RRB- .

PG: CNN_DailyMail+WikiAll E1: [UNK] Future Work 5.1 Future 5.1 Future Work One One One is a [UNK] [UNK] [UNK] [UNK] [UNK] [UNK] [UNK] [UNK] [UNK] [UNK] One One One One One One One One One One One One One One One One . [UNK] is a [UNK] .

PG: CNN_DailyMail+WikiAll E2: [UNK] privacy is a branch of computer science that aims to improve the quality of mobile devices . [UNK] can be applied to mobile devices as well as the application of mobile devices to view their history and outcomes . [UNK] application is used to measure the privacy guarantees of mobile devices . [UNK] application is used to measure the privacy guarantees of mobile devices . [UNK] application is used to determine the privacy guarantees of group signatures . [UNK] application is used to measure the privacy guarantees of mobile devices . [UNK] application is used to determine the privacy guarantees of group signatures .

PINTO, S. RTL Functional Test Generation Using Factored Concolic Execution. Thesis, Virginia Tech, July 2017. <http://hdl.handle.net/10919/78397>

Chapter 1

Gold standard summary: Rapid test generation at a high level of design abstraction, such as the Register Transfer Level (RTL), used by engineers to implement hardware (electronic circuit) specifications, can aid validation of hardware designs. In this domain, Sen coined the term concolic execution (a portmanteau of concrete and symbolic) based on engaging classical symbolic execution over concrete execution paths from testing with concrete inputs. CORT (Concolic RTL Test Generator), a new test generation framework, was designed for rapid generation using a new methodology of systematically growing a new type of test decision tree (TDT) over short explorations of highly efficient cycle-by-cycle concolic execution. The novel methodology aids the automation of testing functional level hardware description with the aim of maximizing branch coverage. CORT's advantages were demonstrated by generating high-branch coverage tests for the ITC99 and IWLS-2005 benchmarks. Further, its tests were smaller, and generation faster, than other approaches.

PG: CNN_DailyMail E1: consumes as much , or more , resources than design development . Random test generation for functional metrics at a high level of design abstraction such as the Register Transfer Level -LRB- -LRB- -LRB- -RRB- -RRB- -RRB- -RRB- -RRB- -RRB- . None

PG: CNN_DailyMail E2: Introduction Hardware design validation consumes as much , or more , resources than design development . Commonly used functional metrics are akin to their software testing counterparts , i.e. , statement coverage , branch coverage , path coverage and assertion coverage -LSB- 3 -RSB- . the go-to standard approach of constrained random test generation is proving to be unsuitable for achieving high functional coverage . None

PG: WikiAll E1: Introduction Hardware design validation -LRB- [UNK] -RRB- is a software testing tool developed by [UNK] et al. . It was developed by [UNK] et al. in 1990 . It is based on the premise that the design of constrained random test generation has been superseded by symbolic evaluation .

PG: CNN_DailyMail+WikiThesis E2: [UNK] test generation for functional metrics at a high level of design abstraction such as the Register Transfer Level -LRB- design validation consumes as much , or more , resources than design development . Rapid test generation is proving to be unsuitable for achieving high functional coverage . To test generation is proving to be unsuitable for achieving high functional coverage . The test generation is automated to decrease the overall human effort and redirect it for suitable goals . The test generation is orders of magnitude faster than previous hybrid concrete and symbolic evaluation based techniques while retaining their advantage of achieving a high branch coverage at the RTL using the least number of input vectors .

PG: CNN_DailyMail+WikiAll E1: [UNK] Hardware [UNK] [UNK] [UNK] -RRB- -RRB- is a [UNK] [UNK] [UNK] [UNK] [UNK] -RRB- -RRB- -RRB- -RRB- -RRB- -RRB- -RRB- -RRB- -RRB- -RRB- . [UNK] was developed by [UNK] [UNK] and [UNK] [UNK] in the [UNK] [UNK] [UNK] [UNK] -RSB- -RSB- . [UNK] was developed by [UNK] [UNK] and [UNK] et al. -LSB- [UNK] -RSB- , and was developed by [UNK] [UNK] and [UNK] [UNK] .

Gold standard summary: Improving the validation of hardware design builds upon automated functional test generation, concolic execution, scaling through factored exploration, use of Verilator, and Register Transfer Level (RTL) instrumentation. Due to differences between Hardware Description Languages (HDLs) and software languages, where many testing approaches have had good success, new approaches are needed for RTL test generation, such as hybrids of constraint-based and search-based techniques. Concolic execution explores a tree of possible execution paths and yields a concrete execution trace; tests are generated corresponding to the leaf nodes in the response tree. Scaling the concolic execution is aided by factoring the exploration into smaller tests and obtaining the initial values of signals through instrumentation, each time bringing the system away from the initial state. Measuring branch coverage is done automatically by Verilator, an open source transpiler (source-to-source compiler), which automatically instruments the source code. Related work includes HYBRO, an RTL directed test generator that symbolically executes the concrete trace extracted from the design Control Flow Graph (CFG), PACOST, that uses factored explorations, and BEACON, with dynamically calculated branch coverage based heuristics.

PG: CNN_DailyMail E1: explain fundamental concepts and contrasts previous work in the field of test generation at the Register Transfer Level (RTL) . [UNK] : software development , Similar to software development , with the ease of development , it also brings the risk of introducing design errors at the higher abstraction layer . None

PG: CNN_DailyMail E2: Automated RTL Test Hardware . the RTL test generation at the Register Transfer Level (RTL) is a hybrid testing technique . the RTL test generation effort is still relegated to constrained or directed random testing . None

PG: WikiAll E1: A hardware design (RTL) is a type of software testing that can be used as a tool to solve the problem of language development . It is a type of software testing that can be used as a method of software development .

PG: CNN_DailyMail+WikiAll E2: [UNK] computer science , STRATEGATE is a branch of computer science that focuses on the development of software development . [UNK] design is used to determine the response of design errors at the higher abstraction layer , possibly due to direct human error or incorrect interpretation of language constructs . [UNK] RTL provides high-level behavioral information for ensuring that the design conforms to its specifications and architecture and that it does not display any behavior inimical to its functional performance . The RTL provides high-level behavioral information for directed test generation that can offer a better chance of solving problems like state justification .

PINTO, S. RTL Functional Test Generation Using Factored Concolic Execution. Thesis, Virginia Tech, July 2017. <http://hdl.handle.net/10919/78397>

Chapter 3

Gold standard summary: A novel concolic execution methodology is geared towards rapidly generating tests at the Register Transfer Level (RTL). The goal of this methodology is to generate a multi-cycle sequential test that maximizes branch coverage, in the shortest amount of time. The cycle-by-cycle concolic execution methodology proposed offers a significant reduction in functional test generation time. The methodology involves preprocessing and instrumentation with concrete trace recording and Register Transfer Level (RTL) translation and analysis. The RTL concolic execution involves two-pass simulation, dynamic discovery and mutation of activated guards, and iterative bounded explorations. Experimentation considers branch coverage and test generation runtime.

PG: CNN_DailyMail E1: methodology is to generate a multi-cycle sequential test that maximizes branch coverage , in the shortest amount of time . The following is a brief overview of our hybrid concrete and symbolic simulation test . symbolic expressions are only constructed for primary input stimulated -LRB- . None

PG: CNN_DailyMail E2: overall test is to generate a multi-cycle sequential test that maximizes branch coverage , in the shortest amount of time . The built over several explorations using randomly generated concrete input vectors -LRB- concrete stimuli -RRB- from a predetermined starting system state -LRB- say , system reset -RRB- , bounded to a fixed number of simulation cycles . The overall test is the optimal concatenation of tests selected from pool of all tests recorded so far . None

PG: WikiAll E1: concolic is a proprietary concrete and symbolic simulation test developed by [UNK] [UNK] . It was developed by [UNK] [UNK] and [UNK] [UNK] at the University of Illinois at Urbana-Champaign . It is based on the symbolic evaluation of activated control points -LRB- RTL -RRB- of activated control points -LRB- RTL -RRB- of activated control points -LRB- RTL -RRB- .

PG: CNN_DailyMail+WikiThesis E1: The execution methodology is a [UNK] execution methodology geared towards rapidly generating tests at the Register Transfer Level -LRB- . The overall test is iteratively built over several explorations using randomly generated concrete input vectors -LRB- concrete stimuli -RRB- . The goal of this methodology is to generate a multi-cycle sequential test that maximizes branch coverage , in the shortest amount of time .

PG: CNN_DailyMail+WikiThesis E2: [UNK] execution methodology is a novel concolic execution methodology proposed in this thesis offers a significant reduction in functional test generation time compared to previous work -LSB- 17 , 25 -RSB- based on similar hybrid concrete and symbolic evaluation . The goal of this methodology is to generate a multi-cycle sequential test that maximizes branch coverage , in the shortest amount of time . The overall test is iteratively built over several explorations using randomly generated concrete input vectors -LRB- concrete stimuli -RRB- , from a predetermined starting system state -LRB- say , system reset -RRB- , bounded to a fixed number of simulation cycles .

PG: CNN_DailyMail+WikiAll E1: The [UNK] [UNK] [UNK] -LRB- -RRB- -RRB- is a methodology for analyzing the concrete and symbolic evaluation of concrete input vectors . [UNK] is a [UNK] execution methodology that is used to determine the concrete and symbolic evaluation of concrete . [UNK] methodology is used to determine the application of concrete and symbolic evaluation .

PG: CNN_DailyMail+WikiAll E2: [UNK] [UNK] execution methodology is a methodology for analyzing the concrete and symbolic evaluation of the concrete branch of concrete stimuli . [UNK] was developed by [UNK] [UNK] and [UNK] [UNK] in the [UNK] [UNK] of [UNK] [UNK] . The was developed by [UNK] [UNK] and [UNK] [UNK] [UNK] in the [UNK] [UNK] [UNK] [UNK] [UNK] [UNK] . [UNK] was developed by [UNK] [UNK] and [UNK] [UNK] [UNK] in the [UNK] [UNK] of [UNK] [UNK] . The was developed by [UNK] [UNK] and [UNK] [UNK] [UNK] in the [UNK] [UNK] of [UNK] [UNK] . [UNK] was first published in [UNK] in [UNK] [UNK] , [UNK] [UNK] , and [UNK] [UNK] [UNK] [UNK] [UNK] [UNK] .

PINTO, S. RTL Functional Test Generation Using Factored Concolic Execution. Thesis, Virginia Tech, July 2017. <http://hdl.handle.net/10919/78397>

Chapter 4

Gold standard summary: Concolic execution on its own is hindered by the limitations of path explosion and computational effort of evaluation over a large number of cycles. The entire Control Flow Graph (CFG) of the design is processed every cycle. Factoring the exploration into a smaller number of cycles and combining the results of each exploration offers a promising avenue to scale the test generation. CORT (Concolic RTL Test Generator), employs a novel methodology for RTL directed test generation that aims to maximize branch coverage with a minimal number of test vectors, in the shortest amount of time. The test generation problem is treated as a task of iteratively building the global Test Decision Tree (TDT) for the design over each exploration. Key is the paradigm of the Test Decision Tree, along with its construction and interpretation. The CORT framework includes preprocessing, concolic execution engine, test generation, and systematic exploration. Evaluation through experimentation considers branch coverage and the effects of exploration length.

PG: CNN_DailyMail E1: The Generation using Factored Explorations Concolic execution on its own is hindered by the same limitations of path explosion and computational effort of evaluation with a large number of cycles . The demonstrated in -LSB- , factoring the exploration into a smaller number of cycles and combining the results of each exploration role . None

PG: CNN_DailyMail E2: Test Generation using Factored Explorations execution on its own is hindered by the same limitations of path explosion and computational effort of evaluation over a large number of cycles . The work treats the test generation that aims to maximize branch coverage with a minimal number of test vectors , in the shortest amount of time . The measures reduce the cost of symbolic evaluation effort . None

PG: WikiAll E1: The CORT test is a tool used to measure the cost of test generation problem -LRB- RTL -RRB- of evaluation over a large number of cycles . It is based on the premise that the design of the test generation problem is based on path explosion and computational effort of evaluation over a large number of cycles . It is used to measure the cost of symbolic evaluation over a large number of cycles .

PG: WikiAll E2: The Test Decision Tree -LRB- CORT -RRB- is one of the world 's first test generation methodology developed by [UNK] [UNK] . It was developed by [UNK] [UNK] and published by [UNK] [UNK] . It was developed by [UNK] [UNK] and published by [UNK] [UNK] . It is also available in the United States and Canada . It is also available as a tool for [UNK] and [UNK] [UNK] . It is also available as a decision tree in the United States as well as the United States Environmental Protection Agency -LRB- [UNK] -RRB- . It is a part of the Test Decision Tree -LRB- [UNK] -RRB- .

PG: CNN_DailyMail+WikiThesis E1: [UNK] is a methodology for the design over each exploration of the design in the concrete simulation . The work treats the test generation problem as a task of path explosion and computational effort of evaluation over a large number of cycles .

PG: CNN_DailyMail+WikiThesis E2: [UNK] is a methodology for RTL directed test generation that aims to maximize branch coverage with a minimal number of test vectors , in the shortest amount of time . The order to reveal alternate execution paths in the concrete simulation , the decision tree requires a reverse traversal from that node towards the root gathering input vectors along the way . The data node leads to a new control node which will branch into two children , along edges called default and mutate , indicating the concrete execution -LRB- default execution -RRB- and mutation stimuli -RRB- the control-flow .

PG: CNN_DailyMail+WikiAll E1: [UNK] [UNK] [UNK] [UNK] -LRB- -RRB- -RRB- is a [UNK] [UNK] [UNK] [UNK] [UNK] -RRB- -RRB- -RRB- -RRB- -RRB- -RRB- -RRB- -RRB- -RRB- -RRB- -RRB- -RRB- -RRB- -RRB- -RRB- . [UNK] was developed by [UNK] [UNK] and [UNK] [UNK] in the [UNK] [UNK] [UNK] [UNK] [UNK] -RRB- . [UNK] test was developed by [UNK] [UNK] and [UNK] [UNK] .

PG: CNN_DailyMail E1: Conclusion Limitations and Future Work In our work , the concrete values of variables can only be read between , not during , cycles . The the CEE encounters such a situation in the concrete path , it is reported to the user , and the program terminates . The is mimicked by using temporary variables which are function scoped -LRB- and not declared at the top . None

PG: CNN_DailyMail E2: Conclusion Limitations and Future Work In our work , the concrete values of variables can only be read between , not during , cycles . The user is expected to insert a temporary internal variable in the RTL to mirror the first blocking definition . This adds no functional value and does not increase the size of the synthesized design , but is quite helpful for concolic execution . None

PG: WikiAll E1: The C++ programming language -LRB- RTL -RRB- is a methodology used in the design of concrete applications . It is used to solve problems in concrete values , and can be used to solve problems in the concrete values of the concrete values of variables .

PG: WikiAll E2: In computer science , a path constraint is a type of execution methodology that is used to solve the execution of a system . It is also used in the context of software engineering . It is also used in the context of software engineering . It is also used in the context of software engineering . It is also used in a number of disciplines including computer science , computer science , computer science , computer science , computer science , computer science , computer science , computer science , computer science , computer science , computer science , computer science , computer science , computer science , computer science , computer science , and computer science .

PG: CNN_DailyMail+WikiThesis E1: [UNK] is a statement between two blocking definitions of the same variable , then no valid -LRB- cycle -RRB- cycle -RRB- concrete values can read for its use . The adds no functional value and does not increase the size of the synthesized design , but is quite helpful for concolic execution .

PG: CNN_DailyMail+WikiThesis E2: [UNK] is a novel by the [UNK] Decision Tree -LRB- -LRB- -RRB- -RRB- -RRB- -RRB- -RRB- -RRB- -RRB- -RRB- -RRB- -RRB- -RRB- -RRB- -RRB- -RRB- -RRB- -RRB- . [UNK] simulator is [UNK] by using temporary variables which are function scoped -LRB- and not declared at the top class level -RRB- . The are listed as follows . Our method tightly interleaves concrete simulation and symbolic evaluation at a cycle-by-cycle level , providing advantageous performance over previous hybrid techniques . Our execution methodology is tested against previous work and is demonstrated to be significantly superior . Our execution methodology for the Register Transfer Level -LRB- -LRB- RTL the control-flow response of the design in terms of stimuli , it does not account for system states .

PG: CNN_DailyMail+WikiAll E1: [UNK] [UNK] and Future Work In [UNK] -RRB- is a [UNK] [UNK] [UNK] [UNK] -RRB- -RRB- -RRB- -RRB- -RRB- -RRB- -RRB- -RRB- -RRB- -RRB- -RRB- -RRB- -RRB- -RRB- -RRB- . [UNK] was developed by [UNK] [UNK] [UNK] and [UNK] [UNK] [UNK] [UNK] [UNK] .



Appendix C

Comparing Seq2Seq Auto-Generated Summaries with Gold Standards

This appendix provides side-by-side comparisons of the gold standard summaries and the summaries produced by our Seq2Seq models.

WYGAL, M. T. *Supporting New Teachers through Induction Programs: New Teacher Perceptions of Mentoring and Instructional Coaching*. Thesis, Virginia Tech, Jan. 2017. <http://hdl.handle.net/10919/74050>

Chapter 1

Gold standard summary: School districts in the United States are having trouble retaining quality teachers. To address this problem, some school districts are providing early-career teachers with induction programs, which involve mentoring and instructional coaching, both examples of job embedded professional development. This case study evaluates novice elementary school teacher perceptions of the mentoring and instructional coaching programs they experienced in one school district. It also investigates the perception of lead mentors and instructional coaches regarding induction efforts. Data for this study comes from interviews with teachers, feedback forms, and classroom observations.

Seq2Seq: CNN_DailyMail: <UNK> new teachers are faced with making it in a challenging field on their own . <UNK> <UNK> new teachers are faced with making it in a challenging field on their own . <UNK> <UNK> new teachers are faced with making it in a challenging field on their own . <UNK> None

Seq2Seq: WikiAll: <UNK> educators Experienced -LRB- <UNK> -RRB- is a <UNK> of the United States .</s><s>The United States .</s>
Seq2Seq: CNN_DailyMail+WikiThesis: <UNK> <UNK> <UNK> is a a <UNK> . <UNK>
Seq2Seq: CNN_DailyMail+WikiAll: <UNK> educators Experienced -LRB- <UNK> -RRB- is a <UNK> educators of Study Experienced -LRB- <UNK> -RRB- is a <UNK> of the field of the field of the field of the field of the United States .</s>

WYGAL, M. T. <i>Supporting New Teachers through Induction Programs: New Teacher Perceptions of Mentoring and Instructional Coaching</i> . Thesis, Virginia Tech, Jan. 2017. http://hdl.handle.net/10919/74050
Chapter 2
Gold standard summary: Research related to teacher induction programs is reviewed, considering their background, need, purpose, design, and outcomes. Likewise, mentoring and coaching programs are reviewed, and their roles in an induction program. There has been a rapid growth in teacher induction programs, up from 40 in the early 1990s to over 80 in 2006. Induction programs across the country vary in quality, but the literature suggests that teaching is such an extreme challenge that any assistance is helpful. Studies show that induction programs contribute to improvements in teacher quality and retention, and give school districts a positive return on investment. Mentorship programs help build supportive relationships between senior and junior teachers, which is believed to contribute to increased retention and professional commitment. Instructional coaching yields high teacher satisfaction and improvements in teaching practices. Mentorship programs and instructional coaching both can help teachers to feel less isolated, which is a leading cause of teacher attrition.
Seq2Seq: CNN_DailyMail: <UNK> I will present research related to the different aspects of new teacher induction programs . <UNK> <UNK> Finally will be given to the areas of overlap between mentoring and instructional coaching programs . <UNK> <UNK> Induction will be given to the areas of overlap between mentoring and instructional coaching programs . <UNK> None
Seq2Seq: WikiAll: <UNK> is a school of the United States .</s><s>The United States .</s>
Seq2Seq: CNN_DailyMail+WikiThesis: <UNK> <UNK> <UNK> is a <UNK> . <UNK>

WYGAL, M. T. *Supporting New Teachers through Induction Programs: New Teacher Perceptions of Mentoring and Instructional Coaching*. Thesis, Virginia Tech, Jan. 2017. <http://hdl.handle.net/10919/74050>

Chapter 5

Gold standard summary: The study's findings – on mentoring and instructional coaching program components, that novice teachers need emotional support followed by academic and instructional guidance, and the roles of mentors and instructional coaches regarding emotional and academic support – indicate that the induction programs were very similar to what was described in the reviewed literature. It corroborates prior work in reporting novice teachers' feelings of isolation and the stress teachers feel due to the emphasis on testing. The findings show that support first needed to come in the form of emotional support and relationships building through mentorship in order for instructional coaching to be effective. This study provides new insight into how mentor programs and instructional coaching best work together, one providing emotional support while the other provides instructional support. Further research is needed to examine what happens after the induction period concludes, if these findings are also applicable to secondary school teachers, and if aspects of induction programs could be employed as part of university curriculum. Overall, this study found that having an induction program that includes both mentoring and instructional coaching can help school districts retain new teachers. Further work could enhance the consistency of mentoring programs, and ensure balance in the level of support provided.

Seq2Seq: CNN_DailyMail: <UNK> Chapter chapter set the basis for the purpose of this study . <UNK> <UNK> <UNK> chapter presented the history and background of each support offered to teachers . <UNK> <UNK> the need to examine support for new teachers throughout their first few years of teaching . <UNK> None

Gold standard summary: The Mexican bean beetle, *Epilachna varivestis* Mulsant, is an aboveground chewing pest of many commercially grown legumes such as common beans, lima beans, tepary beans, soybeans, alfalfa, beggarweed, and cowpea. Regarding geographical distribution, they are native to western Mexico and Central America, they range over most of the USA and southern Canada, especially in the Mid-Atlantic and Appalachian Mountain regions. Their life cycle (pupa, larva, egg, and adult) proceeds within the canopy of host plants, feeding primarily on leaves and secondarily on pods. Adults have a round body shape, concealed head, and black dorsal spots. Regarding colonization of host plants as well as the susceptibility and resistance among host plants, both thrive similarly as temperature and rainfall vary; overwintered adults can fly long distances to find host plants. Various management techniques have been tried, such as cultural, physical/mechanical, chemical and biological; success had come mostly from resistant crops, reflective plastic mulch, the eulophid wasp, *Pediobius foveolatus*, and chemical controls. The native range and spread of the beetle, fluctuations in pest status, and cause for pest decline indicate that climate change as well as interventions have reduced the threat, but it still is serious. Research objectives cover study related to the beetle, planting snap beans on a highly reflective mulch, and growing snap beans from thiamethoxam-treated seeds.

Seq2Seq: CNN_DailyMail: <UNK> may include tepary *Phaseolus* -RRB- , common beans -LRB- -RRB- -RRB- . <UNK> <UNK> The native range of Mexican bean beetle is thought to be in the high elevations of western Mexico . <UNK> <UNK> Damaging populations are most common in the Mid - Atlantic and Kuhar 2013 . <UNK> None

Seq2Seq: WikiAll: <UNK> <UNK> -LRB- born <UNK> -RRB- is a United States -LRB- <UNK> -RRB- is a <UNK> of the United States -LRB- <UNK> -RRB- .</s>

Seq2Seq: CNN_DailyMail+WikiThesis: <UNK> <UNK> is a <UNK> <UNK> .

Seq2Seq: CNN_DailyMail+WikiAll: <UNK> is a United States -LRB- <UNK> -RRB- is a United States -LRB- <UNK> <UNK> -RRB- is a United States -LRB- <UNK> <UNK> -RRB- is a <UNK> of the United States .</s>

NOTTINGHAM, L. *Development and Evaluation of Integrated Approaches for Managing of Mexican Bean Beetle, Epilachna varivestis Mulsant*. Thesis, Virginia Tech, Jan. 2017. <http://hdl.handle.net/10919/74881>

Chapter 2

Gold standard summary: The effect of Mexican bean beetle on three types of snap beans, three lima bean cultivars, and one soybean cultivar was evaluated experimentally, considering their susceptibility to the beetle. Most susceptible was the purple wax snap bean, Dragon’s Tongue; avoiding planting susceptible cultivars or applying management methods should be considered. Susceptibility decreased from snap beans to lima beans to soybeans. The small-plot field experiments conducted 2013-2016 at Virginia Tech’s Kentland Research Farm examined Mexican bean beetle attraction, developmental success, and injury potential to popular snap bean and lima bean cultivars; mark-release-recapture experiments also proceeded there. Greenhouse experiments examined the developmental success of beetle larvae in a controlled setting. JMP was used to analyze the data, which showed a significant effect from the choice of cultivar. Mark-release-capture studies helped when focussing on biological factors; field cage plot experiments yielded the highest number of recaptures.

Seq2Seq: CNN_DailyMail: <UNK> Coccinellidae -RRB- is the most suitable host species to Mexican bean beetle . <UNK> <UNK> the most suitable host species to Mexican bean beetle and Turner 1924 . <UNK> <UNK> more snap beans cultivars are susceptible to feeding injury than lima beans -LRB- . <UNK> None

Seq2Seq: WikiAll: <UNK> <UNK> -LRB- born <UNK> -RRB- is a species of <UNK> , and <UNK> , and <UNK> , and <UNK> , <UNK> , <UNK> , and <UNK> , <UNK> , <UNK> , and <UNK> , <UNK> , <UNK> , and <UNK> , <UNK> , <UNK> , and <UNK> .</s>

Seq2Seq: CNN_DailyMail+WikiThesis: <UNK> <UNK> is a <UNK> . <UNK>

Seq2Seq: CNN_DailyMail+WikiAll: <UNK> varivestis -LRB- born <UNK> -RRB- is a <UNK> <UNK> <UNK> -LRB- <UNK> -RRB- is a <UNK> in <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , and <UNK> .</s>

NOTTINGHAM, L. *Development and Evaluation of Integrated Approaches for Managing of Mexican Bean Beetle, Epilachna varivestis Mulsant*. Thesis, Virginia Tech, Jan. 2017. <http://hdl.handle.net/10919/74881>

Chapter 3

Gold standard summary: Mexican bean beetles are intolerant to direct sunlight and are typically found on the undersides of leaves. Plastic mulch is commonly used for weed control and controlling soil temperature and evaporation. Highly reflective mulches (e.g., with aluminum or silver) have been used to mitigate injury and disease transmission from various insects. Small scale experiments in 2014 and 2015 at Virginia Tech’s Kentland Farm tested if Dragon’s Tongue snap beans grown on metallized, highly reflective, agricultural polyethylene would have fewer Mexican bean beetles and less injury than those grown on black plastic or bare soil, due to the higher reflected light intensity. Significant reductions in Mexican bean beetle densities and feeding injury were observed in both metalized and white plastic plots compared to black plastic and bare soil. Results suggest that growing snap beans on reflective plastic mulch can suppress the incidence and damage of Mexican bean beetle, and increase yield in snap beans, two times that from white or black plastic, and five times greater than bare soil.

Seq2Seq: CNN_DailyMail: <UNK> Mexican bean beetle has achieved economic pest status primarily on snap beans . <UNK> <UNK> Although bean beetle is found throughout the U.S. , it is most common and severe in the Mid-Atlantic . <UNK> <UNK> Adults and larvae use chewing mouthparts to dislodge tissue from leaves and pods . <UNK> None

Seq2Seq: CNN_DailyMail+WikiThesis: <UNK> <UNK> , <UNK> , <UNK> , <UNK> .
Seq2Seq: CNN_DailyMail+WikiAll: <UNK> varivestis -LRB- born <UNK> -RRB- is a <UNK> in the United States -LRB- <UNK> <UNK> -RRB- is a control of the United States -LRB- <UNK> <UNK> -RRB- is a control of the United States .</s>

NOTTINGHAM, L. *Development and Evaluation of Integrated Approaches for Managing of Mexican Bean Beetle, Epilachna varivestis Mulsant*. Thesis, Virginia Tech, Jan. 2017. <http://hdl.handle.net/10919/74881>

Chapter 4

Gold standard summary: The neonicotinoid insecticide thiamethoxam, is commonly applied, perhaps over used, as a seed-coating (seed-treatment) to commercial snap beans. Previous studies highlight the efficacy of this seed-treatment in snap beans, however, none have been conducted in agroecosystems where the predominating pest is the Mexican bean beetle. The goal of experiments 2013-2016 at Virginia Tech's Kentland Farm was to quantify effects of growing snap beans from thiamethoxam-treated seed on Mexican bean beetle densities and feeding injury, toxicity to *Podisus maculiventris* (a common predator of the beetle), densities of other arthropods (herbivores and predators), and crop performance. Greenhouse assays showed roughly 90 fatal effects thirteen days after planting, with lower levels after, which led to reduced effect on beetle populations in 4 out of 5 field tests because of delays from seasonal and environmental differences. Though thiamethoxam-treated seeds can provide significant control of Mexican bean beetles and other pests of snap beans, the potential as well as limitations should be considered, along with other management approaches.

Seq2Seq: CNN_DailyMail: <UNK> neonicotinoid are pretreated by manufacturers with lower rates of active ingredient compared to in-furrow sprays . <UNK> <UNK> Seeds are pretreated by manufacturers with lower rates of active ingredient compared to in-furrow sprays , soil drenches . <UNK> <UNK> Lastly , some neonicotinoids , have been shown to trigger physiological stress responses of plants . <UNK> None

Seq2Seq: CNN_DailyMail+WikiThesis: <UNK> <UNK> <UNK> is a <UNK> <UNK> .

Seq2Seq: CNN_DailyMail+WikiAll: <UNK> insecticides -LRB- <UNK> -RRB- is a <UNK> -LRB- <UNK> -RRB- is a <UNK> -LRB- <UNK> -RRB- -RRB- is a <UNK> of the <UNK> <UNK> -LRB- <UNK> -RRB- is a <UNK> of the Mid-Atlantic of the Mid-Atlantic of the Mid-Atlantic of the Mid-Atlantic of the <UNK> .</s>

NOTTINGHAM, L. *Development and Evaluation of Integrated Approaches for Managing of Mexican Bean Beetle, Epilachna varivestis Mulsant*. Thesis, Virginia Tech, Jan. 2017. <http://hdl.handle.net/10919/74881>

Chapter 5

Gold standard summary: Research starting in 2012 at Virginia Tech’s Kentland Farm began with observation, at all life-stages, of heavy Mexican bean beetle infestation of snap bean plants. The serious problems of the 1960s and 1970s in this regard were reduced for large-scale conventional growers, partly since their farms rarely overlapped with the range of the beetle, but there was severe impact in the Appalachian Mountains in non-chemical small to mid-sized farms, determined by surveying growers across the country. This led to a literature review, screening of cultivars for susceptibility to the beetles, and identification of Dragon’s Tongue as highly susceptible. While in snap beans the pest is relatively easy to control using one or two foliar applications of standard insecticides, and thiamethoxam seed-treatments can benefit growers within the range of the Mexican bean beetle, this beetle still poses a problem for organic growers. It was found that the novel management strategy of reflective plastic mulch was effective in reducing injury. Growing a late-season double-crop like lettuce can leverage the expense of the plastic, and choosing other cultivars like Caprice together with a trap crop like Dragon’s Tongue, can be effective solutions to the beetle problem.

Seq2Seq: CNN_DailyMail: <UNK> Snap bean plants growing on the farm were heavily infested with all life-stages of the beetle . <UNK> <UNK> the first obstacle was to explore and document the status of the pest geographically and its impact on growers . <UNK> <UNK> In bean beetle is a serious threat to organic growers mainly . <UNK> None

Seq2Seq: WikiAll: <UNK> is a <UNK> of the <UNK> of the <UNK> of the <UNK> of the <UNK> of the <UNK> of the pest of the pest of the pest of the pest of the pest of the pest of the pest of the pest of the pest of the pest of the pest of the pest of the <UNK> .</s>

Gold standard summary: Peanuts, which are a leguminous crop, are rich in calories and vital nutrients, vitamins, antioxidants, minerals. They have many health benefits. Being a staple food in Ghana, they are highly important for the region. Cancer-causing aflatoxins are secondary metabolites of some aspergillus fungi. Regulations on aflatoxins have been established, to protect humans and animals from their harmful effects. Aflatoxin-producing fungi need favorable temperature, relative humidity and grain moisture conditions to grow and produce toxins. Aflatoxin production can occur in the field prior to harvest also. Both pre and post-harvest aflatoxin contamination may cause losses of Grains. Post harvest peanut activities are conducive for aflatoxin development. Since storage is an important factor to combat the contamination, various storage solutions have been developed. Some of the storage solutions can pose challenges under Ghanaian conditions Chemical and bio-control can leave residues on peanuts during and after storage. Getting carbon dioxide, nitrogen, and other inert gases to displace oxygen under modified and controlled atmosphere can also be challenging. However, it can meet the goal of finding an appropriate, affordable, and adaptable storage system to help reduce or control aspergillus growth, aflatoxin production, and maintain the quality of peanuts. In addition, packages friendlier to the Ghanaian environment are hermetic storage and active packaging. The type of packaging used for storage can also reduce the rate of lipid oxidation and quality deterioration.

Seq2Seq: CNN_DailyMail: <UNK> Peanuts are rich in calories and contain many nutrients , vitamins , antioxidants and minerals . <UNK> <UNK> They contain high amounts of fats and proteins and can be used in curbing protein energy malnutrition -LRB- Eshun . <UNK> <UNK> They contain high amounts of fats and proteins and can be used in curbing protein energy . <UNK> None

Seq2Seq: WikiAll: <UNK> is a production of the country of the country of the country of the country of Ghana .</s>

Seq2Seq: CNN_DailyMail+WikiThesis: <UNK> <UNK> <UNK> is a <UNK> <UNK> .

Seq2Seq: CNN_DailyMail+WikiAll: <UNK> is a production of the production of three separate in the country of Ghana .</s>

DARKO, C. B. *Effects of Storage Conditions of Aspergillus Growth and Aflatoxin Production in Peanuts. A Study in Ghana.* Thesis, Virginia Tech, Feb. 2017. <http://hdl.handle.net/10919/75020>

Chapter 3

Gold standard summary: Studies have shown an escalation of aflatoxigenic fungi growth and aflatoxin production under favorable environmental conditions. Thus, it is important to find storage systems to reduce or eliminate aflatoxin during such conditions. Results indicate that using zero-oxygen hermetic packaging helps suppress aflatoxin production and quality deterioration. Also, partially-roasted-blanch-sorted peanuts show a potential for reducing or eliminating aflatoxin levels during storage. The study has shown that it is best to clean peanuts either by sorting or disinfecting the peanuts before storage. To achieve lower aflatoxin values during storage, it is best to partially roast the peanut samples, blanch them and then sort the bad ones out before storage or processing. Hermetic bags with oxygen absorbers are effective for controlling fungi growth and aflatoxin as well as maintaining quality. Therefore, it is recommended that peanuts be stored hermetically with zero-oxygen in the package.

Seq2Seq: CNN_DailyMail: <UNK> The intake is the third leading cause of cancer death globally . <UNK> <UNK> This is a great concern in Sub-Saharan Africa , because peanuts are extensively . <UNK> <UNK> The is a great concern in Sub-Saharan Africa , because peanuts are extensively . <UNK> None

<p>Seq2Seq: CNN_DailyMail: <UNK> Peanuts are rich in calories and contain many nutrients , vitamins , antioxidants and minerals . <UNK> <UNK> Peanuts also contain a high amount of fats and proteins . <UNK> <UNK> Peanuts also contain a high amount of fats and proteins . <UNK> None</p>
<p>Seq2Seq: WikiAll: <UNK> Peanut is a <UNK> crop of the <UNK> of the <UNK> , and <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , and <UNK> .</s></p>
<p>Seq2Seq: CNN_DailyMail+WikiThesis: <UNK> <UNK> <UNK> is a <UNK> <UNK> .</p>

Gold standard summary: In Ghana and in other countries Sub-Saharan Africa, aflatoxin fungi infestation causes the post-harvest loss in peanuts. Since polypropylene woven sacks are not airtight, peanuts stored in them are susceptible to fungal and aflatoxin contamination. Studies have shown that hermetic packs can be used effectively to suppress fungi growth, aflatoxin production and quality deterioration in stored peanuts. As the peanut business in Ghana is generally profitable, farmers and traders stand to make additional revenue and profits from switching from traditional packaging to hermetic storage. The study aims to determine if the new hermetic storage technology is more profitable than existing storage methods, before recommending it for peanut farmers and traders. While the new storage technology improves the farmer and trader profitability, it has the potential to reduce the incidence of various ailments that have been attributed to aflatoxins. Hence, the local production and marketing of a hermetic storage system should be encouraged, along with the active creation of awareness of their benefits in reducing the incidence of aflatoxins. In considering the significant national economic impacts of aflatoxins, peanut farmers and traders could be assisted through various financing schemes to acquire the new technology.

Seq2Seq: CNN_DailyMail: <UNK> Postharvest losses for grains are about 18-25 of the total amount of grains . <UNK> <UNK> the undernourished losses could adequately meet the minimum annual food requirements of 48 million people -LRB- Bank . <UNK> <UNK> Peanuts contain a high amount of fats and proteins , and can be used in curbing protein . <UNK> None

Seq2Seq: WikiAll: <UNK> is a Aspergillus of food produced for human food produced for human food produced for human consumption .</s>

DARKO, C. B. *Effects of Storage Conditions of Aspergillus Growth and Aflatoxin Production in Peanuts. A Study in Ghana.* Thesis, Virginia Tech, Feb. 2017. <http://hdl.handle.net/10919/75020>

Chapter 6

Gold standard summary: Sorting raw peanuts and storing it hermetically can best maintain quality and suppress aflatoxin production compared to sorted peanuts in polypropylene woven sacks. The best combination for aflatoxin protection is to partially roast, blanch, sort out the infested and discolored peanuts, and hermetically store them.

Seq2Seq: CNN_DailyMail: <UNK> This is of great concern in Ghana , because peanuts are mixed with baby food as a source of protein . <UNK> <UNK> This contamination also creates a trade barrier and results in great economic losses to exporters . <UNK> <UNK> the need to find a storage system that would be able control aflatoxin production in storage . <UNK> None

Seq2Seq: WikiAll: <UNK> contamination is a <UNK> intake of the ailments associated of the United States .</s>

Seq2Seq: CNN_DailyMail+WikiThesis: <UNK> <UNK> <UNK> is a <UNK> <UNK> . <UNK>

Seq2Seq: CNN_DailyMail+WikiAll: <UNK> is a storage system of the United States .</s><s>The level of the United States .</s><s>The level of the United States .</s><s>The level of the United States .</s><s>The level of the United States of the United States .</s><s>The level of the United States .</s><s>The level of the United States .</s>

PENT, G. *Lamb performance, behavior, and body temperatures in hardwood silvopasture systems.* Thesis, Virginia Tech, Mar. 2017. <http://hdl.handle.net/10919/76730>

Chapter 1

Chapter 2

Gold standard summary: Lamb productivity in hardwood silvopastures has key factors including forage productivity, nutritive value, and species composition. Forage response and lamb performance within hardwood silvopasture systems are compared to open pastures. The honeylocust silvopasture supported the same stocking rate as the open pastures, but the black walnut silvopastures, with lower forage availability, supported fewer animals for 2014-2016 at Virginia Tech's Kentland Farm, where 50-70 sheep were involved each year, and measurements were made of temperature, forage, and weight gains. Both of the cases support equivalent lamb live weight gains compared to conventional open pastures.

Seq2Seq: CNN_DailyMail: <UNK> Some studies have indicated that animal gains are similar or better despite lower forage yield . <UNK> <UNK> Some studies have indicated that animal gains are similar or better despite lower forage yield . <UNK> <UNK> black walnut - and honeylocust-based silvopasture systems were compared with open pastures in a randomized complete block design . <UNK> None

Seq2Seq: CNN_DailyMail+WikiAll: <UNK> value , and species composition in the open pastures -LRB- <UNK> <UNK> -RRB- is a black walnut of the black walnut of the black walnut and the black walnut of the black walnut and the black walnut of the black walnut and the black walnut of the black walnut and the black walnut of the black walnut .</s>

PENT, G. *Lamb performance, behavior, and body temperatures in hardwood silvopasture systems*. Thesis, Virginia Tech, Mar. 2017. <http://hdl.handle.net/10919/76730>

Chapter 3

Gold standard summary: The behavior of lambs in a conventional pasture system and hardwood silvopastures was documented with video (trail cameras for the entire subpaddock containing the lambs) and audio (microphone near the mouth). That was followed by time lapse and acoustic analysis, which involved manual labeling of 5 types of behavior, and spectral analysis of grazing. Results show that lambs preferred shade and actively search for it, spending over 90 of daylight hours in shade. Lambs spent more time lying down in the silvopastures, where they were more comfortable, and more time standing up in the open pastures. From the acoustic analysis, no significant differences were found in daily bite counts and bite count by time of day. Ambient conditions in the silvopastures were more favorable for grazing than in the open pastures; grazing in the black walnut silvopastures was more frequent than in other settings. However, an increased heat tolerance of the lambs may minimize the difference in grazing behavior between lambs in silvopastures and open pastures.

Seq2Seq: CNN_DailyMail: <UNK> While production and nutritive value vary quite widely depending on tree species and management . <UNK> <UNK> While deciduous may differ from open pastures in terms of forage yield , composition , or nutritive value . <UNK> <UNK> animal behaviors may experience more time with conditions 58 suitable for grazing and increase dry matter . <UNK> None

Seq2Seq: WikiAll: <UNK> 57 is a <UNK> <UNK> <UNK> -LRB- <UNK> -RRB- is a <UNK> <UNK> <UNK> <UNK> <UNK> <UNK> <UNK> -LRB- <UNK> -RRB- -RRB- is a <UNK> of the <UNK> <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , and <UNK> .</s>

Seq2Seq: CNN_DailyMail+WikiThesis: <UNK> <UNK> <UNK> is a <UNK> <UNK> .

Seq2Seq: CNN_DailyMail+WikiAll: <UNK> is a capacity of the animals grazing in the large fluctuation of the large fluctuation of the large fluctuation of the large fluctuation of the large fluctuation of the animal must of the animal must of the rumen of the rumen of the rumen of the rumen of the animal must .</s>

PENT, G. *Lamb performance, behavior, and body temperatures in hardwood silvopasture systems*. Thesis, Virginia Tech, Mar. 2017. <http://hdl.handle.net/10919/76730>

Chapter 5

Gold standard summary: Honeylocust pods, once sheep get used to them as a protein-rich feed, can supplement cool season forages, and are available in silvopastures. Lamb productivity during the winter months in open pastures and black walnut (*Juglans nigra*) silvopastures is studied as is the effect of honeylocust tree pods on lamb growth when animals grazed stockpiled tall fescue. The net biomass production of forage and pods from the honeylocust silvopastures exceeded the biomass production of the open pastures. The improved weight gains with pod consumption by the lambs indicate that there may be a benefit to live weight gains when honeylocust pods are consumed by lambs in a cool-season forage based system.

Seq2Seq: CNN_DailyMail: <UNK> trees in silvopastures may provide forage-livestock systems with multiple goods and services . <UNK> <UNK> trees in silvopastures may provide forage-livestock systems with multiple goods and services , including shade , shelter , and browse -LRB- . <UNK> <UNK> The pods produced by these trees also drop in early winter . <UNK> None

Gold standard summary: Despite decades of continuous reform, American students lag behind their international counterparts in STEM proficiencies and lack interest in pursuing related careers. With the shift of US economy from an industrial to a post-industrial economy, additional requirements for general skills has emerged including learning, reasoning, communicating, general problem-solving skills, and behavioral skills. Several underlying theories and models are situated within best practices as identified through scholarly literature and recommended the NAGC. These practices are also supported by the evaluation instrument used by the VDOE. Learning and development, assessment, curriculum planning and instruction, learning environments, programming, and professional development are individual keystones, yet build a supportive bridge between gifted program inputs and program goals.

Seq2Seq: CNN_DailyMail: <UNK> students are inadequately prepared for today 's fast-paced scientific and technology-driven society . <UNK> <UNK> students are inadequately prepared for today 's fast-paced scientific and technology-driven society . <UNK> <UNK> There is little agreement amongst scholars as to what defines a STEM-literate individual -LRB- , 2012 -RRB- . <UNK> None

Chapter 2

Gold standard summary: A national problem of preparing students for a contemporary society, widely recognized through landmark reports in the 1980's, was confirmed to still exist within the educational system of the United States. Evidence was provided to show that a deficit of STEM literacy has led to a widening gap between scientific and technological developers and average citizens, a threat to global competitiveness, and inability to maintain a future STEM-capable workforce. Though a natural resource of future leaders and innovators, gifted students are often largely ignored in all-inclusive classrooms; the No Child Left Behind initiative has been particularly detrimental to the gifted student population. To maximize the learning experiences of these gifted students, accelerated and differentiated programs that focus on STEM disciplines have been recognized as a viable solution for the national problem. Though ranging in various frameworks, these programs have a higher rate of students graduating with STEM degrees compared to the national average. The Virginia Governor's Schools provide gifted services, through academic and visual and performing arts opportunities, to approximately 6,500 students in Virginia with many schools promoting a STEM-focused curriculum; 17 of the 19 Academic-Year Governor's Schools have a STEM focus. The evaluation procedures of these programs were recognized to play an important role in providing evidence to the effectiveness of these programs, thus leading to one solution to the national problem.

Seq2Seq: CNN_DailyMail: <UNK> the orientation of the statewide program within traditional gifted services , the implementation of STEM-focused . <UNK> <UNK> the orientation of the statewide program within traditional gifted services , the implementation of STEM-focused pedagogical . <UNK> <UNK> the orientation of the statewide program within traditional gifted services , the implementation of STEM-focused . <UNK> None

Seq2Seq: WikiAll: <UNK> To better -LRB- <UNK> -RRB- is a gifted of the statewide of the United States .</s>

Seq2Seq: CNN_DailyMail+WikiThesis: <UNK> <UNK> <UNK> is a <UNK> <UNK>

Gold standard summary: The primary purpose of the study was to collect consequential evidence surrounding an untested rubric used during the evaluations of five STEM-focused Virginia Governor’s Schools. Quantitative findings were presented in the form of descriptive statistics to address Research Question 1, while the qualitative findings were presented in the form of categories and conclusions to address Research Question 2 and Research Question 3. The descriptive analysis revealed that the collective proficiency levels of the AYGS programs were rated as Doesn’t meet standard (n= 19, 6.10), Meets standard (n= 248, 80), and Exceeds standard (n= 43, 13.87) for the 62 standards in the 2014 Governor’s School Full- Site Evaluation rubric. The content analysis revealed the six emergent themes from the findings, commendations, and recommendations of the evaluation reports: (a) supported faculty are a catalyst for program achievement; (b) instructional technology is important for STEM education; (c) stakeholder engagement is fundamental to program success and improvement; (d) out of the classroom and into the world; (e) culture of accomplishment in the classroom; and (f) opportunities exist for the educational leadership. The thematic analysis uncovered that evaluators envision the “best practices” for gifted students similarly, but personal experiences and pedagogical philosophies lead to more critical evaluation of some standards over others. Evaluators had an overall positive impressions on the evaluation procedures.

Seq2Seq: CNN_DailyMail: <UNK> the study was intended to assist evaluation designers in determining rubric education . <UNK> <UNK> the study was intended to assist evaluation designers in determining rubric education . <UNK> <UNK> the study was intended to assist evaluation designers in determining rubric education . <UNK> <UNK> How are the collective proficiency levels of Virginia ’s Schools ’ full-site evaluations . <UNK> None

Seq2Seq: WikiAll: <UNK> FOUR -LRB- born <UNK> -RRB- is a research questions of the study of the study of the study of the study of the study of the study of the study of the study of the study of the study of the study of the study of the study of the study of the study of the study of the study of the study of the rubric .</s>

Gold standard summary: The research questions that directed this study were based upon concerns from stakeholders that the 2014 Governor’s School Full-Site Evaluation rubric was an untested instrument that was leading to modifications of programming within the Governor’s Schools. The inclusive results of rubric implementation have identified general areas of strengths and weaknesses in program curriculum, professional development, program design, guidance and counseling, identification and selection processes, and facilities amongst the five schools. Evaluators who have used the instrument have similar perceptions and expectations of how AYGS faculty should implement best practices. The conclusion of this study is not to assess the effectiveness of the instrument, but condense major findings to inform evaluation designers of consequential evidence. Major findings of the study are highlighted as follows: (a) the instrument supports the development of the gifted student as an individual; (b) the instrument supports faculty that are committed to building positive relationships, scholarship, and pursuing professional development; (c) the instrument supports developing STEM-capable students through scientific exploration and civic involvement; and (d) the instrument contains constructs of importance, relevance, and usefulness. Evaluators were positive in their impressions of the AYGS evaluation procedures and welcomed opportunities to observe the spectrum of strategies implemented to deliver gifted services. The perceptions of best practices were analogous amongst participants and observed incidences of best practices manifested in diverse ways. Recommendations are for rubric designers to restructure the rubric to undergo a psychometric assessment and/or ensure the language is evaluative instead of descriptive, modify standards to increase relevancy (e.g. student identification), provide definitions for rubric terminology, and specify what evidence of program actions are to be sought to ensure quality programming.

Seq2Seq: CNN_DailyMail: <UNK> the current findings , commendations , and recommendations among the five schools . <UNK> <UNK> the current findings , commendations , and recommendations among the five schools , highlight emerging trends . <UNK> <UNK> How was so that evaluation designers may be well-informed when determining instrument efficacy . <UNK> None

Seq2Seq: WikiAll: <UNK> is a <UNK> of the <UNK> of the <UNK> of the <UNK> of the <UNK> of the <UNK> of the <UNK> of the <UNK> of the <UNK> of the <UNK> of the <UNK> .</s>
Seq2Seq: CNN_DailyMail+WikiThesis: <UNK> <UNK> <UNK> is a <UNK> <UNK> . <UNK>
Seq2Seq: CNN_DailyMail+WikiAll: <UNK> is a Problem of individuals qualified to the <UNK> of the <UNK> of individuals qualified to the <UNK> of individuals qualified to the superintendency of the superintendency of the superintendency of the superintendency of the superintendency of the superintendency of the superintendency of the superintendency of the superintendency of the superintendency of the superintendency .</s>

FORREST, G. L. <i>Job Satisfaction of Female Superintendents: Role Conflict and Role Commitment</i> . Thesis, Virginia Tech, Mar. 2017. http://hdl.handle.net/10919/76741
Chapter 2
Gold standard summary: The literature analyzed pertinent research that illustrates and investigates the problems and practices related to female superintendents like balancing work and family, underrepresentation, concept of power, qualified but unwilling or uninterested, limited research, job satisfaction, lack of growth, effect of family life on interest or ability and pointed out that a need for further research on female superintendents in general and, particularly, the balance between these women’s work and life. In doing so, three themes emerged—1) Affirming Issues, 2) Clarifying Misconstructions, and 3) Leadership Practices of Female Superintendents. While affirming the fact that women should not simply be hired due to their gender, some of the research calls for tearing down a system that can subdue female leaders or aspiring leaders. As an alternative, educators, and particularly educational leaders should be identifying a problem and creatively finding ways to adapt, resulting in a tangible, meaningful, and reasonable solution. In doing so, the conspiracy of silence would no longer be muted.
Seq2Seq: CNN_DailyMail: <UNK> female leaders in education began with a discussion of the shortage of female leaders in general . <UNK> <UNK> there is a shortage of women PK-12 leaders . <UNK> <UNK> there was a shortage of women PK-12 leaders . <UNK> <UNK> there was a shortage of women PK-12 leaders . <UNK> None

Gold standard summary: In summary, research hypothesis that superintendents who had greater internal role conflict would be less satisfied with their job was found not to be the case and moreover, no statistically significant relationship between role conflict and role commitment was found so this research fails to reject the null hypothesis. The major conclusion drawn was regarding the direct relationship between role conflict and role commitment, that is school boards do not want employees who are more committed to work having greater internal role conflict.

Seq2Seq: CNN_DailyMail: <UNK> the research hypothesis stated that women who were more committed to either work or home . <UNK> <UNK> the research hypothesis stated that women who were more committed to either work or home . <UNK> <UNK> no statistically significant relationship between them and the dependent variable , job satisfaction . <UNK> None

Seq2Seq: WikiAll: <UNK> is a research questions of the research questions of the research questions of the research questions of the research questions of the research hypothesis of the research hypothesis of the research hypothesis of the research hypothesis of the research hypothesis of the research hypothesis .</s>

Seq2Seq: CNN_DailyMail+WikiThesis: <UNK> role commitment . <UNK> <UNK> role conflict and role conflict and role commitment . <UNK> <UNK>

Seq2Seq: CNN_DailyMail+WikiAll: <UNK> DISCUSSION is a research hypothesis for the research questions and this study variables of the research questions and the research questions and the research questions and the research questions and the research questions and the research questions and the research questions and the research questions and job satisfaction .</s>

TIAN, Y. Self-Powered Intelligent Traffic Monitoring Using IR Lidar and Camera. Thesis, Virginia Tech, Feb. 2017. <http://hdl.handle.net/10919/74949>

Chapter 1

<p>Seq2Seq: CNN_DailyMail: <UNK> a review of dynamic power management techniques in traffic monitoring is provided . <UNK> <UNK> Traffic monitoring approaches reviewed include pneumatic tube sensor , inductive loop sensors , microwave radars , machine vision sensors , etc. . <UNK> <UNK> Literature monitoring 2.2.1 monitoring systems have been widely used till today mostly are stationary sensors that are installed in a specific location . <UNK> None</p>
<p>Seq2Seq: WikiAll: <UNK> is a <UNK> of the <UNK> of the <UNK> of the <UNK> of the <UNK> of the <UNK> of the <UNK> of the <UNK> of the <UNK> of the <UNK> of the <UNK> of the <UNK> of the <UNK> of the <UNK> of the <UNK> .</s></p>
<p>Seq2Seq: CNN_DailyMail+WikiThesis: <UNK> 2 . <UNK> <UNK> <UNK> is a <UNK> . <UNK></p>
<p>Seq2Seq: CNN_DailyMail+WikiAll: <UNK> is a <UNK> of the <UNK> of the <UNK> of the <UNK> of the <UNK> of the <UNK> of the <UNK> of the <UNK> of the <UNK> of the <UNK> of the <UNK> of the <UNK> of the <UNK> of the <UNK> of the <UNK> of the <UNK> of the <UNK> of the <UNK> of the <UNK> of the <UNK> .</s></p>

<p>TIAN, Y. Self-Powered Intelligent Traffic Monitoring Using IR Lidar and Camera. Thesis, Virginia Tech, Feb. 2017. http://hdl.handle.net/10919/74949</p>
<p>Chapter 3</p>
<p>Gold standard summary: Fundamental elements (components and their characteristics) in traffic monitoring are analyzed as the base to develop a reliable traffic monitoring system. Traffic system infrastructure includes roads, traffic signals, poles, and structures like overpasses. Users include vehicles and pedestrians. External factors include weather and illumination. Further, urban traffic monitoring problem is formulated by defining what variables are to be measured and estimated. Next, four traffic measurement procedures (at a point, over a short section, over a length of road, by moving observer) used in traffic engineering are presented, followed by how these procedures are realized using different types of sensors. Properties of these two categories of sensors are discussed.</p>

Seq2Seq: CNN_DailyMail: <UNK> urban transportation system are discussed and leads to the formulation of urban traffic monitoring problem . <UNK> <UNK> 3.1 Fundamental elements in urban traffic monitoring , traffic system user and external factors as such weather conditions are three of the key elements . <UNK> <UNK> the road parameters need to be considered in traffic monitoring include lane number , lane width , speed limit . <UNK> None

Seq2Seq: WikiAll: <UNK> is a formulation of Traffic Monitoring monitoring in the United States .</s>

Seq2Seq: CNN_DailyMail+WikiThesis: <UNK> <UNK> <UNK> <UNK> is a road . <UNK>

Seq2Seq: CNN_DailyMail+WikiAll: <UNK> is a formulation of Traffic Monitoring in the urban of the <UNK> of the <UNK> of the <UNK> of the <UNK> of the <UNK> of the <UNK> of the <UNK> of the <UNK> of the <UNK> of the lanes of the lanes of the lanes of the key system .</s>

TIAN, Y. Self-Powered Intelligent Traffic Monitoring Using IR Lidar and Camera. Thesis, Virginia Tech, Feb. 2017. <http://hdl.handle.net/10919/74949>

Chapter 4

Gold standard summary: The traffic monitoring approach is described in detail starting with three detection techniques (measurement with Lidar, camera, and laser points in frame). Then, formulation of traffic monitoring in the Kalman filter framework is presented, including state definition, motion model, and sensor model. After that, sensor fusion by grid-based method is introduced, followed by how non-Gaussian uncertainty is handled. Finally, the whole traffic information estimation process is summarized and comprehensively explained.

Seq2Seq: CNN_DailyMail: <UNK> the data 's reliability fundamentally decides the performance of the system . <UNK> <UNK> the data 's reliability fundamentally decides the performance of the system . <UNK> <UNK> the proposed approach is based on the fusion of three techniques . <UNK> None

Gold standard summary: A dynamic power management (DPM) approach is developed based on traffic flow behavior prediction, including the theory and realization in practice. First, the basic idea of how energy reduction is achieved in traffic monitoring through dynamic power management is introduced. After that, the working process is demonstrated, followed by the formulation of power state machine definition. Finally, the power policy of the power state manager is presented. The power policy is reflected through three power state transitions including inter-vehicle and inter-group considerations.

Seq2Seq: CNN_DailyMail: <UNK> The developed system adopts a power management strategy called Dynamic . <UNK> <UNK> traffic flow has shown its nature of regularity and predictability . <UNK> <UNK> traffic flow has shown its nature of regularity and predictability . <UNK> None

Seq2Seq: WikiAll: <UNK> is a traffic of traffic monitoring systems in the United States .</s>

Seq2Seq: CNN_DailyMail+WikiThesis: <UNK> <UNK> <UNK> <UNK> is a a influence . <UNK>

Seq2Seq: CNN_DailyMail+WikiAll: <UNK> is a traffic monitoring systems in the figure of traffic monitoring systems in the figure of traffic Since development of ITS Monitoring Since development of ITS Monitoring Since development of ITS Monitoring Since development of ITS Monitoring Since development of ITS Monitoring Since development of ITS Monitoring Since development of ITS Monitoring Since development of ITS Monitoring Since development of ITS Monitoring Since development of ITS Monitoring Since development of ITS Monitoring Since development .</s>

TIAN, Y. Self-Powered Intelligent Traffic Monitoring Using IR Lidar and Camera. Thesis, Virginia Tech, Feb. 2017. <http://hdl.handle.net/10919/74949>

Chapter 6

Gold standard summary: The developed system prototype is presented with solar panel, sensor array, and base, also involves Hardware components (Lidar, camera, computing unit) installation and calibration. The system power state machine is described and its power consumption properties, with both Lidar and camera, measured and tested.

Seq2Seq: CNN_DailyMail: <UNK> the system is mainly composed of the self-powered traffic monitoring system . <UNK> <UNK> the system is mainly composed of four units : computing unit with vehicle state estimator . <UNK> <UNK> The system mainly has four units including power supply unit , computing unit and communication unit . <UNK> None

Seq2Seq: WikiAll: <UNK> is a <UNK> traffic monitoring in the self-powered traffic monitoring system , the self-powered traffic monitoring system , the self-powered traffic of the self-powered traffic monitoring system .</s>

Seq2Seq: CNN_DailyMail+WikiThesis: <UNK> <UNK> <UNK> is a system . <UNK>

Seq2Seq: CNN_DailyMail+WikiAll: <UNK> is a developed of the self-powered traffic monitoring system in the self-powered traffic monitoring system in the self-powered traffic monitoring system as the self-powered traffic monitoring system as the self-powered traffic monitoring system as the self-powered traffic monitoring system as the developed of the developed system .</s>

TIAN, Y. Self-Powered Intelligent Traffic Monitoring Using IR Lidar and Camera. Thesis, Virginia Tech, Feb. 2017. <http://hdl.handle.net/10919/74949>

Chapter 7

Gold standard summary: Multiple simulations have been conducted to evaluate the effect of the three power state transition policies used for dynamic power management. To fully analyze all the policies, parametric study has been done in both day and night, busy and free road, close and far section from traffic lights. Based on the simulations, the power management strategy in the developed traffic monitoring system has shown to be able to reduce a decent amount of energy cost and still achieve reasonable detection accuracy by proper parameter setting. In power management based on congestion recognition, about 10 of energy cost is saved in sacrifice of only about 5 detection. Because multiple detection is triggered for each individual vehicle, such sacrifice is very close to a neglectable level. In power management based on inter-vehicle power state transition, by properly configuring service-requester, about 12 energy reduction is achieved in sacrifice of no detection missing. Power management based on inter-group state transition have various performance in different traffic condition. For example, its performance at night is much better than in daytime. And to achieve same amount of energy cost reduction, mostly more missing detection would happen.

Seq2Seq: CNN_DailyMail: <UNK> And using traffic data from the tests , simulations of system power consumption . <UNK> <UNK> the system is installed onto a light pole and is aimed for long-term test . <UNK> <UNK> the system is installed onto a light pole and is aimed for long-term test . <UNK> <UNK> short-term tests have been done multiple times . <UNK> None

Seq2Seq: WikiAll: <UNK> System Experimental Experimental Experimental Experimental Experimental Experimental Experimental , is a light of the tests of the tests of the tests of the tests of the tests of the tests of the tests of the tests of the tests of the tests of the tests of the tests of the tests of the tests of system .</s>

Seq2Seq: CNN_DailyMail+WikiThesis: <UNK> <UNK> <UNK> is a a <UNK> . <UNK>

Seq2Seq: CNN_DailyMail+WikiAll: <UNK> System Experimental Results Experimental Experimental Experimental Experimental Experimental Experimental Experimental , is a power state of the tests of the tests of system power in the tests of the tests of the tests of system power of the tests of the tests of system power .</s>

TIAN, Y. Self-Powered Intelligent Traffic Monitoring Using IR Lidar and Camera. Thesis, Virginia Tech, Feb. 2017. <http://hdl.handle.net/10919/74949>

Gold standard summary: Parallel programming is becoming ubiquitous with an increasing number of cores. Using multithreading, a performance speedup can be experienced due to concurrent execution of threads. Educators' efforts to improve curriculum related to threads can benefit from a special debugging tool to make it easier to program threads, that helps students to better understand bugs and provides a high level description relating to their cause. Past students had expressed difficulty working on fork-join framework; their feedback is a driving factor of the research. Existing debugging tools, such as Helgrind, focus strictly on data-races. They do not identify and describe the high-level root cause of bugs. Willgrind is a special-purpose debugging tool, that is built from scratch using the Valgrind framework, can directly detect bugs and provide high-level descriptions about their cause. WillgrindPlus is a tool that indicate if the student program is vulnerable to a bug that can manifest itself in a different execution. Both Willgrind and WillgrindPlus provide output through an interactive web interface. A user study was performed on Virginia Tech students to evaluate the effectiveness and usefulness of tools. A plethora of different bugs were detected in their submissions.

Seq2Seq: CNN_DailyMail: <UNK> A thread is a unit of sequential execution that can be scheduled to a distinct core . <UNK> <UNK> A threads have remarkable performance advantages , they are difficult to program . <UNK> <UNK> A is usually the rst time they are exposed to multithreading . <UNK> None

NACIRI, W. M. Bug Finding Methods for Multithreaded Student Programming Projects. Thesis, Virginia Tech, Aug. 2017. <http://hdl.handle.net/10919/78675>

Chapter 3

Gold standard summary: The shadow values contain useful information to identify bugs, making shadowing a common technique used by dynamic program analysis tools like Willgrind to detect bugs at run-time. Invariants are the conditions that must hold true during the correct execution of a program. Identifying invariant violations can be used to establish the correctness of a program. The run-time code and instrumentation code in Willgrind runs on the host CPU. While the function replacements run in the guest space. Deadlock is a difficult to detect situation where the system does not make progress because threads are blocked forever, such as two threads requesting each other's locks. Willgrind provides accurate deadlock detection by leveraging program-specific knowledge. Since, visualizations speed up the debugging process, in Willgrind the bugs are reported through a friendly web interface.

Seq2Seq: CNN_DailyMail: <UNK> The is a common technique used by dynamic program analysis . <UNK> <UNK> The is a common technique used by dynamic program analysis . <UNK> <UNK> The uses shadowing to model the correct execution of a fork-join framework . <UNK> None

Seq2Seq: WikiAll: <UNK> is a <UNK> tool of the <UNK> tool of the fork-join framework , a <UNK> tool of the fork-join framework , a <UNK> tool of the fork-join framework , a <UNK> tool of the fork-join framework .</s>

Seq2Seq: CNN_DailyMail+WikiThesis: describes a Valgrind <UNK> is a a Valgrind . <UNK>

Seq2Seq: CNN_DailyMail+WikiAll: <UNK> is a <UNK> tool of the low-level infrastructure in the low-level infrastructure to a <UNK> tool of the <UNK> tool of the <UNK> tool of the <UNK> tool of the <UNK> framework .</s>

NACIRI, W. M. Bug Finding Methods for Multithreaded Student Programming Projects. Thesis, Virginia Tech, Aug. 2017. <http://hdl.handle.net/10919/78675>

Chapter 4

Gold standard summary: An analysis tool was developed to make multithreaded programming easier for students. Although the tool gave successful results in the user study, there is some room for improvement. When detecting a deadlock, the tool only identifies the line number where the threads deadlock. Willgrind could track which locks are held to indicate the exact acquisition that caused the deadlock. WillgrindPlus could be enhanced to detect atomic variables for different memory consistencies.

Seq2Seq: CNN_DailyMail: <UNK> the deadlock detection only shows the line number where the threads deadlock . <UNK> <UNK> A could track which locks are held to indicate the exact acquisition that caused the deadlock . <UNK> None

Seq2Seq: WikiAll: <UNK> Future Work This research This is a <UNK> how in the deadlock code , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> , <UNK> -RRB- is a <UNK> how to the deadlock code .</s>

Seq2Seq: CNN_DailyMail+WikiThesis: <UNK> <UNK> <UNK> <UNK> is a the feedback . <UNK>

Seq2Seq: CNN_DailyMail+WikiAll: <UNK> 7.1 Future Work This research has demonstrated successful results in the user study . <UNK> <UNK> research is a deadlock detection only shows the feedback deadlock detection only shows the deadlock detection only shows the feedback deadlock detection only shows the feedback deadlock detection only shows the feedback deadlock detection only shows the feedback deadlock .</s>

MOLINARO, N. J. The Two Point Correlation Structure of a Cylinder Wake. Thesis, Virginia Tech, June 2017. <http://hdl.handle.net/10919/78296>

Chapter 1

Gold standard summary: The two-point correlation structure and turbulence statistics of a cylinder wake are studied in order to develop accurate prediction methods for an open rotor ingesting turbulence. Understanding wake flow is necessary for understanding the noise produced by a wake generator. Proper Orthogonal Decomposition is used to determine the optimum velocity profile that describes the shape of structures in flow. Two-point correlation functions are used to infer the characteristic eddy structures in each wake using the proper orthogonal decomposition. Comparisons between cylinder structures and airfoil turbulent wake flows will give insight into how and why different inflow conditions produce different sound fields when an open rotor ingests wake flows. Related literature explains the physics of the plane wake including the flow behind a cylinder, universality and self-preservation, and measurements of a NACA 0012 airfoil (studied by Deavenport).

Seq2Seq: CNN_DailyMail: <UNK> a study of the two-point correlation structure of a cylinder wake . <UNK> <UNK> the study is to develop more accurate prediction methods for an open rotor ingesting turbulence . <UNK> <UNK> The two-point velocity is the velocity perpendicular to the blades of a rotor disk . <UNK> None

Seq2Seq: WikiAll: <UNK> is a cylinder wake of the cylinder wake of the cylinder wake of the cylinder wake of the cylinder wake of the cylinder wake .</s>

Seq2Seq: CNN_DailyMail+WikiThesis: <UNK> <UNK> <UNK> is a rotor . <UNK>

Seq2Seq: CNN_DailyMail+WikiAll: <UNK> is a cylinder wake in the cylinder center of the cylinder center of the cylinder center of the cylinder center of the cylinder center of the cylinder wake of the cylinder center .</s>

MOLINARO, N. J. The Two Point Correlation Structure of a Cylinder Wake. Thesis, Virginia Tech, June 2017. <http://hdl.handle.net/10919/78296>

Chapter 2

Gold standard summary: Measurement data was collected at the Virginia Tech Stability Wind Tunnel and the Virginia Tech Open Circuit Wind Tunnel. The first facility is unique in that it can be acoustically quiet without distorting the aerodynamics of the air flow. The model used to generate the wake under investigation in the present study was a machined aluminum circular cylinder with a smooth, near polished surface finish. A computer controlled three-dimensional traverse was used to position probes in the wake of the cylinder to measure wake profiles. The traverses are operated using Matlab code that sets the rake to a desired height in the test section and samples the pressure probes on the rake using an Esterline scanner.

Seq2Seq: CNN_DailyMail: <UNK> The facility is a closed-loop subsonic wind tunnel with a maximum flow velocity of 80 m/s . <UNK> <UNK> The facility is a closed-loop subsonic wind tunnel with a maximum flow velocity of 80 m/s . <UNK> <UNK> The facility has freestream turbulence intensities of 0.021 at 21 and 57 / respectively . <UNK> None

Gold standard summary: The two-dimensionality of the cylinder wake was determined to be acceptable at both test locations and the normalized wakes were judged to be similar. More measurements were made in the open circuit wind tunnel than the stability wind tunnel; these were followed by shifting the measurement grid data, correcting for the angle sensitivity of the hotwire probes, and studying hotwire probe coherence. The two-point time delay correlation depends on three spatial coordinates, so quad-hotwire probes were used to measure the three components of velocity in each flow. The full measurement campaign consisted of 19 independent measurements, where each measurement had a unique fixed probe position. Cylinder wake flow was shown to be substantially more turbulent than the airfoil wake flow, while supporting a very similar mean flow. The two-point correlations showed that structures in the cylinder wake remain coherent to longer time delays and probe separations than those present in the airfoil wake. This suggests that an open rotor ingesting the cylinder wake will produce a very different sound profile than a rotor ingesting an airfoil wake.

Seq2Seq: CNN_DailyMail: <UNK> first measurements performed in study first took place in the Stability Wind Tunnel . <UNK> <UNK> In point statistics and spectra were used to compare with the results from the two-point measurement . <UNK> <UNK> In cylinder were measured using the SWT wake rake 20 diameters downstream . <UNK> None

Gold standard summary: T.S. Eliot's poem 'Burnt Norton and Reflected Light' which originated from his 1934 visit to an old and burned manor house, explores temporal existence and the search for a meaning, sensed but not understood, outside the boundaries of human finitude, through the lens of motion, both linear and non-linear. Initially, the notion that the mind is capable of viewing time with perpetual possibilities is discussed - the idea of 'what could have happened'. The idea of a rose garden is used to describe this notion; wherein this garden is thought to be inspired by the Garden of Eden. This garden is intended to symbolize time's denials and contradictions. The poem then describes the idea of searching for the 'heart of light'. Then, ways to escape linear time after exile from the rose garden are illustrated, into the outside world that has been entrapped by time. The poem then descends into a different realm - using the analogy of an underground metro that is dimly lit and aims to create a contrast between the previously explored shadowy unreality of "time-ridden" lives. Further, the poem talks about returning back to the surface, but a black cloud carries the sun away. The transience of words and music (which are also in motion) is also illustrated. The rose garden and the vision of the 'heart of light' that was earlier visited are glimpsed again. Through a set of images, Eliot guides the reader into the beginning of a search for visions of reality's light.

Seq2Seq: CNN_DailyMail: <UNK> the mind of whomever the speaker is addressing , just as echoes would with a memory . <UNK> <UNK> the poem shifts from a broad and abstract discussion of time to an entrance into one of these existences . <UNK> <UNK> the poem shifts from a broad and abstract discussion of time to an entrance . <UNK> None

DELLINGER, E. A. "The Pattern is Movement": Images of Timelessness and Patterns of Response in T.S. Eliot's Four Quartets. Thesis, Virginia Tech, June 2017. <http://hdl.handle.net/10919/78299>

Chapter 2

Gold standard summary: T.S. Eliot's second poem of the Four Quartets is 'East Coker and the Dance'. While 'Burnt Norton' gives a glimpse outside the linear veneer of time, it presents the problem, of making time stretch before and after, seem to be a waste of time. This poem, East Coker, responds to the problem by delving into this expanse of time before and after, probing into the ridiculousness and seeming endlessness of human limitation in the face of such a moment of vision. It further questions whether existence in time negates the potential of meaningfulness. This question is explored using the image of a dance, which gracefully ties together the motion of time and the stillness of waiting into the search for meaning. Eliot ponders over the cyclicity of life with its perpetual beginning and ending. He also forces the reader to acknowledge the darkness that surrounds everyone and how in this darkness, the 'wisdom of humility' can be found. The poem then discusses the silence of the edges of existence and perception where everything is dark and where even knowledge cannot illuminate this darkness. Thus, what seems like an end, the end of being able to see after entering the darkness, is a part of the dance, and therefore a beginning.

Seq2Seq: CNN_DailyMail: <UNK> the succession of generations appears the endless cyclicity of life , of its perpetual beginnings and ends . <UNK> <UNK> The space of a lifetime seems negligible within the perpetual cycles of generation and destruction . <UNK> <UNK> The personal but distant past Eliot delves into the passage of time on a larger scale . <UNK> None

Gold standard summary: T.S Eliot's third poem from the Four Quartets is 'The Dry Salvages and the Clanging Bell'. The previous poem 'East Coker' gives a response to humanity's position within the 'waste sad time,' which leads to the vision of a dance that draws time and timelessness together into meaning. This poem presents a response to this problem on a larger scale. It develops the image of the sea that was illustrated at the end of East Coker more fully. Memories that were significant to Elliot are translated into an image of a sea of time that is incomprehensibly vast, empty, and endless which contrasts the imagery of a river that is 'knowable, bridgeable, and comprehensible'. Eliot further emphasizes the need to fight and continue seeking meaning despite the inevitability of failure in the chaos of the sea. Similar to the previous poems, the intersection outside reality with the limited realm of humanity warrants the need for a response, the drive to "fare forward." The reflected light and dance of the prior two poems, and the clang of the bell here, all are echoes of the Incarnation, pointing to deeper meaning in the midst of exile, darkness, and chaos.

Seq2Seq: CNN_DailyMail: <UNK> the river once represented " a frontier , " the edges of knowledge and existence . <UNK> <UNK> the river once represented " a frontier , " the edges of knowledge and existence . <UNK> <UNK> the river becomes a " problem , " only significant because of the need to build bridges . <UNK> None

Gold standard summary: Related work and background issues are discussed about crowdsensing platforms, group signatures, threat models, security and privacy goals, and Android mobile computing. Crowdsensing platforms include various architecture components, like group manager, data collector, data obfuscator, MIX network, sensors, and data collection server. They support particular operations like recruitment, task assignment, data submission, revocation, and reward distribution. Using group signature scheme, platform supports anonymous-yet-accountable group sensing. Under threat model, three categories of threats, Data forgery, Identity forgery Honest data collector are identified and addressed through three security and privacy goals, Accountability, Identity Unforgeability, and Sensing-time Anonymity. Android mobile computing discussed the advantage of Crowdsensing in terms of being cost-effective, perpetuate possibilities of tracking and highlighted the significance of adherence to a systematic and disciplined approach to user security.

Seq2Seq: CNN_DailyMail: <UNK> An , an open crowdsensing platform where anyone can submit data . <UNK> <UNK> This constitutes a vulnerability which threatens privacy , data integrity , and reliability standards -LSB- 56 -RSB- . <UNK> <UNK> While accountability protects the data collector , the vast number of crowdsensing participants . <UNK> None

Seq2Seq: CNN_DailyMail+WikiAll: <UNK> Study 3.1 Study 3.1 Study User studies is a user study of the quantitative questions of the <UNK> application of the <UNK> application of the <UNK> application of the quantitative questions asked for the quantitative questions of the quantitative questions asked for the quantitative questions of the quantitative questions asked for the participant of the quantitative questions asked for the participant of the quantitative questions asked .</s>

ROTH, H. M. Smartphone Privacy in Citizen Science. Thesis, Virginia Tech, July 2017. <http://hdl.handle.net/10919/78360>

Chapter 4

Gold standard summary: The Crowdsensing Android Application collects data from sensors including accelerometer, gravity, gyroscope, linear accelerometer, magnetometer, and rotation. The original interface showed battery life as well as sensing status (stopped, paused, sensing) and had related buttons. Building upon the user study, requirements, design, and implementation of a new user interface led to notifications and more button displays, indicating collecting, signing, or sending data to the data collector.

Seq2Seq: CNN_DailyMail: <UNK> the “ Start Sensing ” button text changes to “ Continue ” button . <UNK> <UNK> the “ Start Sensing ” button is clicked , the button text changes to “ Continue ” <UNK> <UNK> the “ Start ” button is clicked , the button text changes to “ Continue ” <UNK> None

Seq2Seq: CNN_DailyMail+WikiAll: <UNK> Android -LRB- born <UNK> -RRB- is a user additionally of the application do ? When the application gives of the application gives of the application gives of the application gives of the application gives of the application gives of the application gives of the application gives of the application gives of the application gives of the application gives of the application gives of the application gives of the application gives of the application gives of the application gives of the application gives of the application gives of the application gives of the application gives in Table .</s>

ROTH, H. M. Smartphone Privacy in Citizen Science. Thesis, Virginia Tech, July 2017. <http://hdl.handle.net/10919/78360>

Chapter 5

Gold standard summary: GROUPOSENSE, crowdsensing prototype with Android support, which elevates risks, limitations, and constraints associated with SRBE is proposed with the capability to expand to meet the needs of any group sensing application. It was developed and evaluated through a user study targeting whether the application, through its security features, obviates the privacy concern among participants. Based on findings, modifications were made to the application which includes additional screens and a sophisticated notification system. This work is significant with respect to security as it preserves the movement of provable secure group signatures closer to practical deployment. In future work, an additional user study is suggested with enhancements like a diversified group of respondents, with the difference in their scale and scope. In terms of Application Modifications, a performance boost, changes in the interface in form of a dashboard, financial exchange application, and identity management practices are suggested. It is also highlighted that large-scale crowdsensing applications require more focused efforts in security and privacy as existing privacy-preserving authentication protocols are inadequate.

Seq2Seq: CNN_DailyMail: <UNK> A follow-up user study should be conducted on the revised application to measure the effectiveness . <UNK> <UNK> the study should be conducted on the revised application to measure the effectiveness and user response . <UNK> <UNK> the study should be asked to participate in the follow-up user study . <UNK> None

Chapter 3

Gold standard summary: A novel concolic execution methodology is geared towards rapidly generating tests at the Register Transfer Level (RTL). The goal of this methodology is to generate a multi-cycle sequential test that maximizes branch coverage, in the shortest amount of time. The cycle-by-cycle concolic execution methodology proposed offers a significant reduction in functional test generation time. The methodology involves preprocessing and instrumentation with concrete trace recording and Register Transfer Level (RTL) translation and analysis. The RTL concolic execution involves two-pass simulation, dynamic discovery and mutation of activated guards, and iterative bounded explorations. Experimentation considers branch coverage and test generation runtime.

Seq2Seq: CNN_DailyMail: <UNK> The goal is to generate a multi-cycle sequential test that maximizes branch coverage . <UNK> <UNK> The overall test is iteratively built over several explorations using randomly generated concrete input . <UNK> <UNK> The statements can be abstracted on primary input . <UNK> None

Seq2Seq: WikiAll: <UNK> Concolic -LRB- born <UNK> -RRB- is a test of the test of the test of the <UNK> of the test of the test of the <UNK> of the test of the <UNK> of the test of the <UNK> .</s>

Seq2Seq: CNN_DailyMail+WikiThesis: <UNK> <UNK> <UNK> is a <UNK> <UNK> .

Seq2Seq: CNN_DailyMail+WikiAll: <UNK> Execution of RTL -LRB- <UNK> -RRB- is a test of the chapter of the chapter of the shortest amount of the chapter of the shortest amount of the chapter of the shortest amount of the chapter of the shortest amount of the chapter of the shortest amount of the chapter of the shortest amount of the chapter of the chapter of the chapter of <UNK> .</s>

PINTO, S. RTL Functional Test Generation Using Factored Concolic Execution. Thesis, Virginia Tech, July 2017. <http://hdl.handle.net/10919/78397>

Chapter 4

Gold standard summary: Concolic execution on its own is hindered by the limitations of path explosion and computational effort of evaluation over a large number of cycles. The entire Control Flow Graph (CFG) of the design is processed every cycle. Factoring the exploration into a smaller number of cycles and combining the results of each exploration offers a promising avenue to scale the test generation. CORT (Concolic RTL Test Generator), employs a novel methodology for RTL directed test generation that aims to maximize branch coverage with a minimal number of test vectors, in the shortest amount of time. The test generation problem is treated as a task of iteratively building the global Test Decision Tree (TDT) for the design over each exploration. Key is the paradigm of the Test Decision Tree, along with its construction and interpretation. The CORT framework includes preprocessing, concolic execution engine, test generation, and systematic exploration. Evaluation through experimentation considers branch coverage and the effects of exploration length.

Seq2Seq: CNN_DailyMail: <UNK> Test Concolic is the same limitations of path explosion and computational effort . <UNK> <UNK> the test generation is a task of iteratively building the global Test Decision -LRB- -RRB- -RRB- . <UNK> <UNK> the test is limited to primary input stimulated -LRB- activated -RRB- statements . <UNK> None

Seq2Seq: WikiAll: <UNK> Explorations <UNK> -LRB- born <UNK> -RRB- is a test of the Test Decision of the test of the test of the test of test vectors .</s>

Appendix D

Comparing RL Auto-Generated Summaries with Gold Standards

This appendix provides side-by-side comparisons of the gold standard summaries and the summaries produced by our RL models.

WYGAL, M. T. <i>Supporting New Teachers through Induction Programs: New Teacher Perceptions of Mentoring and Instructional Coaching</i> . Thesis, Virginia Tech, Jan. 2017. http://hdl.handle.net/10919/74050

Chapter 1

Gold standard summary: School districts in the United States are having trouble retaining quality teachers. To address this problem, some school districts are providing early-career teachers with induction programs, which involve mentoring and instructional coaching, both examples of job embedded professional development. This case study evaluates novice elementary school teacher perceptions of the mentoring and instructional coaching programs they experienced in one school district. It also investigates the perception of lead mentors and instructional coaches regarding induction efforts. Data for this study comes from interviews with teachers, feedback forms, and classroom observations.

RL: CNN_DailyMail: study . experienced educators regard education to be a challenging . they write lesson plans , teach and maintain behaviors . education systems are looking into ways to support new teachers . these tasks , even for an experienced educator , can seem daunting. . they can be very overwhelming for a teacher just starting their career. .

WYGAL, M. T. *Supporting New Teachers through Induction Programs: New Teacher Perceptions of Mentoring and Instructional Coaching*. Thesis, Virginia Tech, Jan. 2017. <http://hdl.handle.net/10919/74050>

Chapter 2

Gold standard summary: Research related to teacher induction programs is reviewed, considering their background, need, purpose, design, and outcomes. Likewise, mentoring and coaching programs are reviewed, and their roles in an induction program. There has been a rapid growth in teacher induction programs, up from 40% in the early 1990s to over 80% in 2006. Induction programs across the country vary in quality, but the literature suggests that teaching is such an extreme challenge that any assistance is helpful. Studies show that induction programs contribute to improvements in teacher quality and retention, and give school districts a positive return on investment. Mentorship programs help build supportive relationships between senior and junior teachers, which is believed to contribute to increased retention and professional commitment. Instructional coaching yields high teacher satisfaction and improvements in teaching practices. Mentorship programs and instructional coaching both can help teachers to feel less isolated, which is a leading cause of teacher attrition.

RL: CNN_DailyMail: in this literature review , i will present research related to the different aspects of new teacher induction . both mentoring and instructional coaching programs will be investigated . consideration will be given to the areas of overlap between mentoring and instructional . programs .

WYGAL, M. T. *Supporting New Teachers through Induction Programs: New Teacher Perceptions of Mentoring and Instructional Coaching*. Thesis, Virginia Tech, Jan. 2017. <http://hdl.handle.net/10919/74050>

Chapter 3

Gold standard summary: Through thematic analysis of interview data, this case study aims to answer the research question of how novice teachers and instructional leaders perceive induction programs involving mentoring and instructional coaching. The study focused on induction programs at two elementary schools in the same school district, housing students in pre-kindergarten through fourth grade, where each had a high degree of recent turnover and new teachers. Data collected for the study was a triangulation of interviews (modeled from Patton) with 4 novice teachers, 2 mentors, and 2 instructional coaches, observational data, and document reviews. Thematic analysis helped discover and synthesize patterns, themes, and categories from the data. Careful considerations ensured the data was collected ethically, and the qualitative analysis was reliable and valid.

RL: CNN_DailyMail: methodology . school districts and administrators have concerns about teachers leaving the profession after just a short time . these programs are intended to support new-comers ' teaching abilities and enable new-comer teachers the opportunity to be as successful . induction programs are one way that districts address this turnover . 's this chapter discusses the study 's research ”

WYGAL, M. T. *Supporting New Teachers through Induction Programs: New Teacher Perceptions of Mentoring and Instructional Coaching*. Thesis, Virginia Tech, Jan. 2017. <http://hdl.handle.net/10919/74050>

Chapter 4

Gold standard summary: The primary source of data for this study of mentoring and instructional coaching in conjunction with new teacher support came from interviews in 4 elementary schools with four novice teachers, two mentors, and two instructional coaches. There were 3 main findings, regarding classroom procedures to academic achievement, emotional support coupled with academic and instructional guidance, and emotional support vs. academic support. Mentorship helped novice teachers learn the practical things not taught in college, and the everyday operations of a teacher. While mentorship is focused on teacher wellbeing and support, instructional coaching aims at student support and their academic success. Novice teachers indicated feelings of overwhelming isolation. They expressed feeling emotionally supported by their mentors, which helped to fight the feeling of isolation. The subjects' reported perceptions of instructional coaching were also positive. The mentors and instructional coaches reported seeing incredible value in the service they offer to novice teachers. Perceptions were learned about each program to improve their function and importance.

RL: CNN_DailyMail: novice teachers need various supports as they begin their careers . supports exist through a variety of venues , such as a buddy teacher , a mentor , and instructional teachers often leave the field of education within their first five years of teaching . this can occur with the proper support and guidance through induction programs. induction . supporting new teachers is critical to their overall career success .

WYGAL, M. T. *Supporting New Teachers through Induction Programs: New Teacher Perceptions of Mentoring and Instructional Coaching*. Thesis, Virginia Tech, Jan. 2017. <http://hdl.handle.net/10919/74050>

Chapter 5

Gold standard summary: The study's findings – on mentoring and instructional coaching program components, that novice teachers need emotional support followed by academic and instructional guidance, and the roles of mentors and instructional coaches regarding emotional and academic support – indicate that the induction programs were very similar to what was described in the reviewed literature. It corroborates prior work in reporting novice teachers' feelings of isolation and the stress teachers feel due to the emphasis on testing. The findings show that support first needed to come in the form of emotional support and relationships building through mentorship in order for instructional coaching to be effective. This study provides new insight into how mentor programs and instructional coaching best work together, one providing emotional support while the other provides instructional support. Further research is needed to examine what happens after the induction period concludes, if these findings are also applicable to secondary school teachers, and if aspects of induction programs could be employed as part of university curriculum. Overall, this study found that having an induction program that includes both mentoring and instructional coaching can help school districts retain new teachers. Further work could enhance the consistency of mentoring programs, and ensure balance in the level of support provided.

RL: CNN_DailyMail: this chapter set the basis for the study and the need to examine support for new teachers . teachers are often leaving the field of education within their first five years of teaching . the chapter presented the history and background of each support offered . in : why novice teachers need support and guidance . mentioned in chapter one were supports that new teachers may encounter in their induction process . in chapter two , i examined research on two primary types of induction programs : mentoring and instructional program design and outcomes were presented to explain the purpose and intention of each method of support new teachers in most school systems around the

NOTTINGHAM, L. *Development and Evaluation of Integrated Approaches for Managing of Mexican Bean Beetle, Epilachna varivestis Mulsant*. Thesis, Virginia Tech, Jan. 2017. <http://hdl.handle.net/10919/74881>

Chapter 1

Gold standard summary: The Mexican bean beetle, *Epilachna varivestis* Mulsant, is an aboveground chewing pest of many commercially grown legumes such as common beans, lima beans, tepary beans, soybeans, alfalfa, beggarweed, and cowpea. Regarding geographical distribution, they are native to western Mexico and Central America, they range over most of the USA and southern Canada, especially in the Mid-Atlantic and Appalachian Mountain regions. Their life cycle (pupa, larva, egg, and adult) proceeds within the canopy of host plants, feeding primarily on leaves and secondarily on pods. Adults have a round body shape, concealed head, and black dorsal spots. Regarding colonization of host plants as well as the susceptibility and resistance among host plants, both thrive similarly as temperature and rainfall vary; overwintered adults can fly long distances to find host plants. Various management techniques have been tried, such as cultural, physical/mechanical, chemical and biological; success had come mostly from resistant crops, reflective plastic mulch, the eulophid wasp, *Pediobius foveolatus*, and chemical controls. The native range and spread of the beetle, fluctuations in pest status, and cause for pest decline indicate that climate change as well as interventions have reduced the threat, but it still is serious. Research objectives cover study related to the beetle, planting snap beans on a highly reflective mulch, and growing snap beans from thiamethoxam-treated seeds.

RL: CNN_DailyMail: mexican bean beetle is an aboveground chewing pest of many commercially grown legumes . hosts may include tepary beans , phaseolus , lima beans . damaging populations are most common in the mid . current range includes most of the united states and southern canada -lr- marcovitch and stanley 1930 , fess 2008 atlantic and southern appalachian mountain regions of the united states -lr- nottingham and kuhar 2013 , 2014 -rr- , due to moderate summer temperatures .

NOTTINGHAM, L. *Development and Evaluation of Integrated Approaches for Managing of Mexican Bean Beetle, Epilachna varivestis Mulsant*. Thesis, Virginia Tech, Jan. 2017. <http://hdl.handle.net/10919/74881>

Chapter 2

Gold standard summary: The effect of Mexican bean beetle on three types of snap beans, three lima bean cultivars, and one soybean cultivar was evaluated experimentally, considering their susceptibility to the beetle. Most susceptible was the purple wax snap bean, Dragon's Tongue; avoiding planting susceptible cultivars or applying management methods should be considered. Susceptibility decreased from snap beans to lima beans to soybeans. The small-plot field experiments conducted 2013-2016 at Virginia Tech's Kentland Research Farm examined Mexican bean beetle attraction, developmental success, and injury potential to popular snap bean and lima bean cultivars; mark-release-recapture experiments also proceeded there. Greenhouse experiments examined the developmental success of beetle larvae in a controlled setting. JMP was used to analyze the data, which showed a significant effect from the choice of cultivar. Mark-release-capture studies helped when focussing on biological factors; field cage plot experiments yielded the highest number of recaptures.

RL: CNN_DailyMail: mexican bean beetle is an herbivorous ladybeetle that feeds exclusively on legumes . list of 1924 -rrb-. . the most suitable host species to mexican bean beetle feeding and development . 1924 1924 , friend and turner 1931 . glycine max merrill , scarlet runner bean , phaseolus coccineus l. , cowpea or black-eyed pea . hosts plants that are less susceptible to injury include soybean .

NOTTINGHAM, L. *Development and Evaluation of Integrated Approaches for Managing of Mexican Bean Beetle, Epilachna varivestis Mulsant*. Thesis, Virginia Tech, Jan. 2017. <http://hdl.handle.net/10919/74881>

Chapter 3

Gold standard summary: Mexican bean beetles are intolerant to direct sunlight and are typically found on the undersides of leaves. Plastic mulch is commonly used for weed control and controlling soil temperature and evaporation. Highly reflective mulches (e.g., with aluminum or silver) have been used to mitigate injury and disease transmission from various insects. Small scale experiments in 2014 and 2015 at Virginia Tech’s Kentland Farm tested if Dragon’s Tongue snap beans grown on metallized, highly reflective, agricultural polyethylene would have fewer Mexican bean beetles and less injury than those grown on black plastic or bare soil, due to the higher reflected light intensity. Significant reductions in Mexican bean beetle densities and feeding injury were observed in both metalized and white plastic plots compared to black plastic and bare soil. Results suggest that growing snap beans on reflective plastic mulch can suppress the incidence and damage of Mexican bean beetle, and increase yield in snap beans, two times that from white or black plastic, and five times greater than bare soil.

RL: CNN_DailyMail: bean beetle , *epilachna varivestis mulsant* , is an herbivorous lady beetle . mexican bean beetle has achieved economic pest status . mexican bean beetle is most common in the u.s. excessive feeding on leaves reduces the plant ’s photosynthetic potential and promotes desiccation . adults and larvae use mouthparts to dislodge tissue from leaves and pods .

NOTTINGHAM, L. *Development and Evaluation of Integrated Approaches for Managing of Mexican Bean Beetle, Epilachna varivestis Mulsant*. Thesis, Virginia Tech, Jan. 2017. <http://hdl.handle.net/10919/74881>

Chapter 5

Gold standard summary: Research starting in 2012 at Virginia Tech's Kentland Farm began with observation, at all life-stages, of heavy Mexican bean beetle infestation of snap bean plants. The serious problems of the 1960s and 1970s in this regard were reduced for large-scale conventional growers, partly since their farms rarely overlapped with the range of the beetle, but there was severe impact in the Appalachian Mountains in non-chemical small to mid-sized farms, determined by surveying growers across the country. This led to a literature review, screening of cultivars for susceptibility to the beetles, and identification of Dragon's Tongue as highly susceptible. While in snap beans the pest is relatively easy to control using one or two foliar applications of standard insecticides, and thiamethoxam seed-treatments can benefit growers within the range of the Mexican bean beetle, this beetle still poses a problem for organic growers. It was found that the novel management strategy of reflective plastic mulch was effective in reducing injury. Growing a late-season double-crop like lettuce can leverage the expense of the plastic, and choosing other cultivars like Caprice together with a trap crop like Dragon's Tongue, can be effective solutions to the beetle problem.

RL: CNN_DailyMail: conclusions . i was introduced to mexican bean beetle at virginia tech 's kentland farm . snap bean plants growing on the farm were infested with all life-stages of the beetle . the first obstacle was to explore and document the status of pest geographically . this beetle pest seemed to be present at this capacity every year at kentland . bean beetle no longer appears to be a pest of soybean . i surveyed growers across the country by attending grower conferences and outreach events .

DARKO, C. B. *Effects of Storage Conditions of Aspergillus Growth and Aflatoxin Production in Peanuts. A Study in Ghana.* Thesis, Virginia Tech, Feb. 2017. <http://hdl.handle.net/10919/75020>

Chapter 1

Gold standard summary: Aflatoxins, which are metabolites of aspergillus species, are major contaminants of staple foods like maize and peanuts in developing areas including Sub-Saharan Africa. The fungi producing aflatoxins are present in the soil. aflatoxins contamination of peanuts is a great global concern due to their carcinogenic effect on humans and livestock, as the intake of aflatoxins is known to cause liver cancer, stunted growth in children and immune system disorders. Cold storage facilities and proper moisture control help controlling the problem in developed nations like the USA. Lack of such an environment in Ghana and most African countries is one the reasons that led this problem to aggravate there. Hermetic storage has been proven to be effective for storing agricultural products. But, its effectiveness for controlling aflatoxin growth in agricultural products has not been established. The key objectives are to: investigate the growth of aspergillus and the production of aflatoxin in shelled peanuts under varying treatment and packaging conditions, determine appropriate pre-storage treatments and packaging, and determine the impact of the switch to hermetic storage on peanut farming and marketing profitability in Ghana.

RL: CNN_DailyMail: staple foods in sub-saharan africa and other parts of the developing world are frequently contaminated with aflatoxins , mostly aspergillus flavus and aspergillus . main crops affected include maize -lrb- corn -rrb- and peanuts . the maximum tolerable aflatoxin level for humans is 20 parts per billion -lrb- ppb -rrb- . eu permitted a maximum level of 4 ppb for total aflatoxins . contamination of peanuts and peanut-based products has been of great concern globally due to their carcinogenic effect on humans and livestock -lrb- amador , 2010 -rrb- aflatoxin carcinoma is the third-leading cause of cancer death globally . aflatoxins have been linked to stunted growth in children and immune system disorders -lrb- jolly et al. , 2008 -rrb-

DARKO, C. B. *Effects of Storage Conditions of Aspergillus Growth and Aflatoxin Production in Peanuts. A Study in Ghana.* Thesis, Virginia Tech, Feb. 2017. <http://hdl.handle.net/10919/75020>

Chapter 2

Gold standard summary: Peanuts, which are a leguminous crop, are rich in calories and vital nutrients, vitamins, antioxidants, minerals. They have many health benefits. Being a staple food in Ghana, they are highly important for the region. Cancer-causing aflatoxins are secondary metabolites of some aspergillus fungi. Regulations on aflatoxins have been established, to protect humans and animals from their harmful effects. Aflatoxin-producing fungi need favorable temperature, relative humidity and grain moisture conditions to grow and produce toxins. Aflatoxin production can occur in the field prior to harvest also. Both pre and post-harvest aflatoxin contamination may cause losses of Grains. Post harvest peanut activities are conducive for aflatoxin development. Since storage is an important factor to combat the contamination, various storage solutions have been developed. Some of the storage solutions can pose challenges under Ghanaian conditions Chemical and bio-control can leave residues on peanuts during and after storage. Getting carbon dioxide, nitrogen, and other inert gases to displace oxygen under modified and controlled atmosphere can also be challenging. However, it can meet the goal of finding an appropriate, affordable, and adaptable storage system to help reduce or control aspergillus growth, aflatoxin production, and maintain the quality of peanuts. In addition, packages friendlier to the Ghanaian environment are hermetic storage and active packaging. The type of packaging used for storage can also reduce the rate of lipid oxidation and quality deterioration.

RL: CNN_DailyMail: peanuts and their importance in Ghana . peanuts are a leguminous crop that belongs to the family of fabaceae , genus arachis and botanically named as arachis . peanuts had a positive effect on cholesterol levels and nutrient intake . they also contain high amounts of fats and proteins . they contain the essential amino acids needed for normal body growth and metabolism -lrb- pelto & armar-klemesu , 2011 -rrb-

DARKO, C. B. *Effects of Storage Conditions of Aspergillus Growth and Aflatoxin Production in Peanuts. A Study in Ghana.* Thesis, Virginia Tech, Feb. 2017. <http://hdl.handle.net/10919/75020>

Chapter 5

Gold standard summary: In Ghana and in other countries Sub-Saharan Africa, aflatoxin fungi infestation causes the post-harvest loss in peanuts. Since polypropylene woven sacks are not airtight, peanuts stored in them are susceptible to fungal and aflatoxin contamination. Studies have shown that hermetic packs can be used effectively to suppress fungi growth, aflatoxin production and quality deterioration in stored peanuts. As the peanut business in Ghana is generally profitable, farmers and traders stand to make additional revenue and profits from switching from traditional packaging to hermetic storage. The study aims to determine if the new hermetic storage technology is more profitable than existing storage methods, before recommending it for peanut farmers and traders. While the new storage technology improves the farmer and trader profitability, it has the potential to reduce the incidence of various ailments that have been attributed to aflatoxins. Hence, the local production and marketing of a hermetic storage system should be encouraged, along with the active creation of awareness of their benefits in reducing the incidence of aflatoxins. In considering the significant national economic impacts of aflatoxins, peanut farmers and traders could be assisted through various financing schemes to acquire the new technology.

RL: CNN_DailyMail: approximately one-third of food produced for human consumption is lost globally . losses for grains are about 18-25 % of the total amount of grains produced annually -lrb- african postharvest losses information system , 2013 in sub-saharan africa , postharvest grain losses account for world bank , 2011 . losses could adequately meet minimum annual food requirements of 48 million people -lrb- world bank , 2011 -rrb- . based on the latest estimates from fao -lrb- 2015 -rrb- about 795 million people remain undernourished among the undernourished , about 239 million are in developing regions .

DARKO, C. B. *Effects of Storage Conditions of Aspergillus Growth and Aflatoxin Production in Peanuts. A Study in Ghana.* Thesis, Virginia Tech, Feb. 2017. <http://hdl.handle.net/10919/75020>

Chapter 6

Gold standard summary: Sorting raw peanuts and storing it hermetically can best maintain quality and suppress aflatoxin production compared to sorted peanuts in polypropylene woven sacks. The best combination for aflatoxin protection is to partially roast, blanch, sort out the infested and discolored peanuts, and hermetically store them.

RL: CNN_DailyMail: peanuts in ghana and other developing countries are frequently contaminated with aflatoxins . aflatoxin contamination of peanuts has been of great concern globally due to their carcinogenic effect on humans . some ailments linked to stunted growth in children and immune system . poor postharvest handling causes high aflatoxin levels and it is worse . ghana is mixed with baby food as a source of protein. . level of aflatoxin contamination also creates trade barrier . contamination is a problem in ghana because the storage system and environmental conditions supports aflatoxin .

PENT, G. *Lamb performance, behavior, and body temperatures in hardwood silvopasture systems*. Thesis, Virginia Tech, Mar. 2017. <http://hdl.handle.net/10919/76730>

Chapter 1

Gold standard summary: Silvopasture, one of five agroforestry practices, integrates trees with pasture-based livestock systems, improving soil conservation and nutrient utilization, with ecosystem, environmental, and production advantages. Livestock can benefit from shade in summer and shelter in winter, while trees benefit from weed suppression and nutrient cycling. More study is needed of animal well-being, behavior, and productivity in silvopastures, especially considering the effect of shade, a potential means for alleviating the effects of hot ambient conditions, that leads to more time grazing and less time standing. Key issues are animal and forage production in silvopastures, ruminant response to heat stress (measured with various indexes and causing problems including reduced dry matter intake, which reduces animal productivity) in extensive conditions, and the effect of shade in mitigating livestock heat stress (indicated by lower mean vaginal temperatures).

RL: CNN_DailyMail: write literature . introduction . climate change and dwindling natural resources has led to a public push to decrease environmental contamination . simple monocultures of animal systems have appealed to livestock producers in the past . diversified systems are managed so as to take advantage of positive interactions among system components . agroforestry offers opportunity to fulfill the demands for increasing food and fiber production .

PENT, G. *Lamb performance, behavior, and body temperatures in hardwood silvopasture systems*. Thesis, Virginia Tech, Mar. 2017. <http://hdl.handle.net/10919/76730>

Chapter 2

Gold standard summary: Lamb productivity in hardwood silvopastures has key factors including forage productivity, nutritive value, and species composition. Forage response and lamb performance within hardwood silvopasture systems are compared to open pastures. The honeylocust silvopasture supported the same stocking rate as the open pastures, but the black walnut silvopastures, with lower forage availability, supported fewer animals for 2014-2016 at Virginia Tech's Kentland Farm, where 50-70 sheep were involved each year, and measurements were made of temperature, forage, and weight gains. Both of the cases support equivalent lamb live weight gains compared to conventional open pastures.

RL: CNN_DailyMail: forage productivity , nutritive value , and species composition in hardwood silvopastures and associated lamb productivity . abstract abstract . pastures were rotationally stocked with 5 to 7 crossbred lambs depending on forage . black walnut and honeylocust-based silvopasture systems were compared with open pastures in a randomized complete block design with three blocks over three some studies have indicated that animal gains are similar or better .

PENT, G. *Lamb performance, behavior, and body temperatures in hardwood silvopasture systems*. Thesis, Virginia Tech, Mar. 2017. <http://hdl.handle.net/10919/76730>

Chapter 3

Gold standard summary: The behavior of lambs in a conventional pasture system and hardwood silvopastures was documented with video (trail cameras for the entire subpaddock containing the lambs) and audio (microphone near the mouth). That was followed by time lapse and acoustic analysis, which involved manual labeling of 5 types of behavior, and spectral analysis of grazing. Results show that lambs preferred shade and actively search for it, spending over 90% of daylight hours in shade. Lambs spent more time lying down in the silvopastures, where they were more comfortable, and more time standing up in the open pastures. From the acoustic analysis, no significant differences were found in daily bite counts and bite count by time of day. Ambient conditions in the silvopastures were more favorable for grazing than in the open pastures; grazing in the black walnut silvopastures was more frequent than in other settings. However, an increased heat tolerance of the lambs may minimize the difference in grazing behavior between lambs in silvopastures and open pastures.

RL: CNN_DailyMail: lamb behavior in hardwood ' 57 introduction . forage production and nutritive value vary quite depending on tree species and management . deciduous silvopastures may differ from open pastures in terms of forage yield , composition . recent research with lambs grazing in black walnut and honeylocust-based silvopasture systems suggests animal performance is comparable to that from open pastures .

PENT, G. *Lamb performance, behavior, and body temperatures in hardwood silvopasture systems*. Thesis, Virginia Tech, Mar. 2017. <http://hdl.handle.net/10919/76730>

Chapter 4

Gold standard summary: To record ewe lamb temperatures in hardwood silvopastures, intravaginal temperature sensors were constructed from blank controlled internal drug release (CIDR) devices and small temperature loggers. Body temperatures of ewe lambs were recorded within a replicate within a week, and these measures were taken sequentially within three experimental periods. The deeper shade of black walnut trees kept lambs in these silvopastures cooler. Ewes in the open pasture experienced more fluctuation in day to nighttime core temperature change. Lambs in the honeylocust silvopastures displayed increasing vaginal temperatures each month. The lambs in the honeylocust silvopastures had similar vaginal temperatures as to lambs in the open pastures, perhaps due to declining shade cover. Overall, lambs in the silvopastures experienced less amplitude in diurnal temperature variation due to the modulating effect that the shade from the trees had on lamb body temperatures.

RL: CNN_DailyMail: ewe lamb vaginal temperatures in hardwood ' introduction . such environments optimize the health and well-being of livestock . 87 benefit of the shade provided by silvopastures in terms of alterations to body temperatures . silvopastures produce equivalent animal output compared to open pastures -lrb- peri et al. , 2001 ; no data are available on the

PENT, G. *Lamb performance, behavior, and body temperatures in hardwood silvopasture systems*. Thesis, Virginia Tech, Mar. 2017. <http://hdl.handle.net/10919/76730>

Chapter 5

Gold standard summary: Honeylocust pods, once sheep get used to them as a protein-rich feed, can supplement cool season forages, and are available in silvopastures. Lamb productivity during the winter months in open pastures and black walnut (*Juglans nigra*) silvopastures is studied as is the effect of honeylocust tree pods on lamb growth when animals grazed stockpiled tall fescue. The net biomass production of forage and pods from the honeylocust silvopastures exceeded the biomass production of the open pastures. The improved weight gains with pod consumption by the lambs indicate that there may be a benefit to live weight gains when honeylocust pods are consumed by lambs in a cool-season forage based system.

RL: CNN_DailyMail: lamb productivity during the winter months in honeylocust and black walnut . introduction . trees in silvopastures may provide forage-livestock systems with multiple goods and services . improved varieties of honeylocust trees . the double-compound leaf arrangement of honeylocust trees minimizes the obstruction of sunlight reaching the forage understory . honeylocust -lrb- *gleditsia triacanthos* l. -rrb- trees produce edible fodder and pods for grazing livestock . the pods produced by these trees also drop in early winter when forage production has otherwise ceased in temperate regions .

PENT, G. *Lamb performance, behavior, and body temperatures in hardwood silvopasture systems*. Thesis, Virginia Tech, Mar. 2017. <http://hdl.handle.net/10919/76730>

Chapter 6

Gold standard summary: The study shows that animal welfare may be improved through the provision of shade. Losses in forage productivity in the black walnut silvopastures were not tied to losses in animal productivity. The benefits to animal comfort provided by the trees in these silvopastures likely compensated for any changes in forage characteristics. Nevertheless, even with the potential products and ecosystem services rendered by the trees in these silvopastures, these systems had similar animal output compared to the conventional open pastures during the summer months and during one winter study; longer term studies seem warranted to extend our understanding.

RL: CNN_DailyMail: conclusions . in addition to the products and environmental services may be improved through the provision of shade. . other studies show the positive impact of shade on animal productivity in intensive , confinement operations . losses in the black walnut silvopastures were not tied to losses . necessity of shade for livestock should not be defined by apparent productivity as heat may negatively affect animal comfort and behavior . the objective of this study was to document not only the productivity of silvopastures .

STITH, K. M. *A Mixed Methods Study on Evaluations of Virginia's STEM-Focused Governor's Schools*. Thesis, Virginia Tech, Mar. 2017. <http://hdl.handle.net/10919/76735>

Chapter 1

Gold standard summary: Despite decades of continuous reform, American students lag behind their international counterparts in STEM proficiencies and lack interest in pursuing related careers. With the shift of US economy from an industrial to a post-industrial economy, additional requirements for general skills has emerged including learning, reasoning, communicating, general problem-solving skills, and behavioral skills. Several underlying theories and models are situated within best practices as identified through scholarly literature and recommended the NAGC. These practices are also supported by the evaluation instrument used by the VDOE. Learning and development, assessment, curriculum planning and instruction, learning environments, programming, and professional development are individual keystones, yet build a supportive bridge between gifted program inputs and program goals.

RL: CNN_DailyMail: introduction . the united states ' educational system has experienced several driving movements . despite decades of continuous reform , the national commission says . periods. . excellence in education 's a nation at risk -lrb- 1983 -rrb- and national science board .

STITH, K. M. *A Mixed Methods Study on Evaluations of Virginia's STEM-Focused Governor's Schools*. Thesis, Virginia Tech, Mar. 2017. <http://hdl.handle.net/10919/76735>

Chapter 3

Gold standard summary: A convergent mixed methods design was used to explore multiple sets of data retrieved from the evaluations of five STEM-focused Annual-Year Governor’s Schools (AYGS) schools. Descriptive and content analyses were completed to inform Research Questions 1 (on collective proficiency levels) and 2 (on emergent theses and recommendations). Evaluators were recruited to participate in the study and interviewed on their interpretations of best practices for AYGS program standards, thus informing research question 3 (on interpretations of evaluators) and six sub-research questions (on how evaluators recognize various types of best practices). Strategies embedded within the study were designed to establish truthfulness, credibility, dependability, and transferability into the study. A pilot study, carried out with one evaluator, aimed to ensure the clarity of the 50 semi-structured interview questions. The analysis included descriptive, content, and thematic aspects. The researcher, a high school science teacher in a Virginia Governor’s school for the last five years, holding a proactive stance intending to promote the Virginia Governor’s Schools, hence chose evaluation to obtain sound evidence.

RL: CNN_DailyMail: methods and procedures overview . the purpose of the study was to collect consequential evidence of an untested rubric . the results of the aygs evaluations were used to prove . identify the current findings , commendations and recommendations . schools , highlight emerging trends , and compare the interpretations of evaluators .

STITH, K. M. *A Mixed Methods Study on Evaluations of Virginia’s STEM-Focused Governor’s Schools*. Thesis, Virginia Tech, Mar. 2017. <http://hdl.handle.net/10919/76735>

Chapter 5

Gold standard summary: The research questions that directed this study were based upon concerns from stakeholders that the 2014 Governor’s School Full-Site Evaluation rubric was an untested instrument that was leading to modifications of programming within the Governor’s Schools. The inclusive results of rubric implementation have identified general areas of strengths and weaknesses in program curriculum, professional development, program design, guidance and counseling, identification and selection processes, and facilities amongst the five schools. Evaluators who have used the instrument have similar perceptions and expectations of how AYGS faculty should implement best practices. The conclusion of this study is not to assess the effectiveness of the instrument, but condense major findings to inform evaluation designers of consequential evidence. Major findings of the study are highlighted as follows: (a) the instrument supports the development of the gifted student as an individual; (b) the instrument supports faculty that are committed to building positive relationships, scholarship, and pursuing professional development; (c) the instrument supports developing STEM-capable students through scientific exploration and civic involvement; and (d) the instrument contains constructs of importance, relevance, and usefulness. Evaluators were positive in their impressions of the AYGS evaluation procedures and welcomed opportunities to observe the spectrum of strategies implemented to deliver gifted services. The perceptions of best practices were analogous amongst participants and observed incidences of best practices manifested in diverse ways. Recommendations are for rubric designers to restructure the rubric to undergo a psychometric assessment and/or ensure the language is evaluative instead of descriptive, modify standards to increase relevancy (e.g. student identification), provide definitions for rubric terminology, and specify what evidence of program actions are to be sought to ensure quality programming.

RL: CNN_DailyMail: five . introduction . aygs ” used for the evaluations of five virginia academic-year governor ’s schools schools . descriptive analysis was conducted on the aygs .

FORREST, G. L. *Job Satisfaction of Female Superintendents: Role Conflict and Role Commitment*. Thesis, Virginia Tech, Mar. 2017. <http://hdl.handle.net/10919/76741>

Chapter 1

Gold standard summary: There is a need for qualified school superintendents, but only a small number are suitably qualified. Among those who apply, the percentage of women is very low. Women's leadership styles are different from men but include positive characteristics like inclusiveness, empathy, effective communication up and down the hierarchy, and broader focus. The majority of those in administrative training programs are women, yet few end up as superintendent. The purpose of this study, in Maryland, Virginia, and North Carolina is to examine different factors affecting female superintendents. Among the questions pursued are what is the relationship of job satisfaction with role conflict and role commitment. The hypothesis is that women having greater internal role conflict about balancing home and work roles will be less satisfied with their position as compared to those having greater role commitment (in home and work). This study should be worth noting by policymakers and aspirants.

RL: CNN_DailyMail: a need exists for qualified superintendents to step into leadership roles . of the few who are superintendents , an even smaller amount of them are women -lrb- harris et al. , 2004 women have demonstrated qualifications to be leaders of organizations in a variety of fields . for example , women 's leadership styles have been characterized by inclusiveness , empathy . buechel-haack -lrb- 2010 -rrb- cited a number of studies that show women are more democratic , more participatory in their leadership styles . women holding superintendent positions have been more adept than men .

FORREST, G. L. *Job Satisfaction of Female Superintendents: Role Conflict and Role Commitment*. Thesis, Virginia Tech, Mar. 2017. <http://hdl.handle.net/10919/76741>

Chapter 2

Gold standard summary: The literature analyzed pertinent research that illustrates and investigates the problems and practices related to female superintendents like balancing work and family, underrepresentation, concept of power, qualified but unwilling or uninterested, limited research, job satisfaction, lack of growth, effect of family life on interest or ability and pointed out that a need for further research on female superintendents in general and, particularly, the balance between these women's work and life. In doing so, three themes emerged—1) Affirming Issues, 2) Clarifying Misconstructions, and 3) Leadership Practices of Female Superintendents. While affirming the fact that women should not simply be hired due to their gender, some of the research calls for tearing down a system that can subdue female leaders or aspiring leaders. As an alternative, educators, and particularly educational leaders should be identifying a problem and creatively finding ways to adapt, resulting in a tangible, meaningful, and reasonable solution. In doing so, the conspiracy of silence would no longer be muted.

RL: CNN_DailyMail: literature . there is a significant body of research about school administrators and female leadership in general -lrb- grogan & shakeshaft , 2010 -rrb- . most studies on female leaders in education began . jordan -lrb- 2014 , p. 10 -rrb- affirmed this when the researcher stated . scholars and educators agreed that there was a shortage of women pk-12 leaders. .

FORREST, G. L. *Job Satisfaction of Female Superintendents: Role Conflict and Role Commitment*. Thesis, Virginia Tech, Mar. 2017. <http://hdl.handle.net/10919/76741>

Chapter 3

Gold standard summary: The methodology in the study involved design, collection, instrumentation, and analysis. Female superintendents (10 in Maryland, 36 in Virginia, and 23 in North Carolina) were surveyed using three instruments: role conflict scale from Holahan and Gilbert to quantify role conflict, role commitment questions from Napholz to clarify commitments between work and home, and a job satisfaction survey from Spector to create sub-scale scores and a total score, rating overall job satisfaction. Once the results were collected, a multiple regression analysis was run, with job satisfaction as the dependent variable and role conflict and role commitment as independent variables.

RL: CNN_DailyMail: methodology . this section will briefly provide an overview of the methodology that was used for the study . female superintendents in maryland , virginia , and north carolina were surveyed . role conflict scales were used to quantify role conflict . question was posed that clarifies commitments between work and home -lrb- napholz , 1995 -rrb- . job satisfaction survey was used to create sub-scale scores and a total score .

FORREST, G. L. *Job Satisfaction of Female Superintendents: Role Conflict and Role Commitment*. Thesis, Virginia Tech, Mar. 2017. <http://hdl.handle.net/10919/76741>

Chapter 4

Gold standard summary: Findings related to the research questions. Demographic and descriptive data are reported before comparing subscales. Data analysis of the relationship among variables found no statistically significant relationship between role conflict and job satisfaction, and the same with role commitment and job satisfaction. For the two independent variables, of role conflict and role commitment, there is no statistically significant relationship between them and the dependent variable, job satisfaction.

RL: CNN_DailyMail: death toll . this chapter will provide an overview of the findings according to the stated research . demographic and descriptive data will be reported . analysis shows . data analysis of relationship among variables will be investigated . of the population -lrb- n = 69 -rrb- , 34 responded to the survey from maryland , virginia , and north carolina for a response rate of 49

FORREST, G. L. *Job Satisfaction of Female Superintendents: Role Conflict and Role Commitment*. Thesis, Virginia Tech, Mar. 2017. <http://hdl.handle.net/10919/76741>

Chapter 5

Gold standard summary: In summary, research hypothesis that superintendents who had greater internal role conflict would be less satisfied with their job was found not to be the case and moreover, no statistically significant relationship between role conflict and role commitment was found so this research fails to reject the null hypothesis. The major conclusion drawn was regarding the direct relationship between role conflict and role commitment, that is school boards do not want employees who are more committed to work having greater internal role conflict.

RL: CNN_DailyMail: report : conclusion , conclusion , and discussion , are summary . the research hypothesis for this study was that female superintendents who had greater internal role would be less satisfied with their job. . this was not found to be the case as there was no significant relationship between role conflict and job satisfaction. . . when combining the two independent variables of role commitment , there is no statistically significant relationship . research : women who were more committed to either work would be more satisfied within their role as a superintendent . research fails to reject the null hypothesis .

TIAN, Y. Self-Powered Intelligent Traffic Monitoring Using IR Lidar and Camera. Thesis, Virginia Tech, Feb. 2017. <http://hdl.handle.net/10919/74949>

Chapter 1

Gold standard summary: Intelligent Transportation Systems' performance depends in part on the output of traffic monitoring systems. Problems with those systems are addressed through: • A traffic monitoring approach that provides reliable traffic information; • Formulation of the traffic monitoring problem in Kalman Filter framework; and • A dynamic power management approach based on traffic flow theory that reduces energy cost of traffic monitoring. A novel infrastructural traffic monitoring approach estimates traffic information by combining three sensing techniques based on two categories of sensors: a background subtraction algorithms on video data, measuring distance using a laser, and using laser range finders. A dynamic power management system shifts to inactive state using traffic flow theory to determine when that is appropriate.

RL: CNN_DailyMail: 1.1 million background . transportation system has been developing for several decades . theoretical basis and is gaining attention from both industry and academia. . warning graphic content . improving transportation safety and mobility , providing real-time route guidance .

TIAN, Y. Self-Powered Intelligent Traffic Monitoring Using IR Lidar and Camera. Thesis, Virginia Tech, Feb. 2017. <http://hdl.handle.net/10919/74949>

Chapter 2

Gold standard summary: Approaches to traffic monitoring, emphasizing infrastructural traffic monitoring (including pneumatic tube sensors, inductive loop sensors, microwave radars, probe vehicle measurement, and machine vision sensors), and dynamic power management (DPM) techniques in traffic monitoring, are reviewed, covering principles, advantages, and disadvantages. The three different basic DPM strategies (greedy, time-out, and predictive) are all based on the understanding of system power consumption and workload properties; for the same system in different functioning stages, different strategies can be implemented.

RL: CNN_DailyMail: police are investigating . write literature . phasis on infrastructural traffic . in this chapter , a summary of approaches is presented with an em . a review of dynamic power management .

TIAN, Y. Self-Powered Intelligent Traffic Monitoring Using IR Lidar and Camera. Thesis, Virginia Tech, Feb. 2017. <http://hdl.handle.net/10919/74949>

Chapter 4

Gold standard summary: The traffic monitoring approach is described in detail starting with three detection techniques (measurement with Lidar, camera, and laser points in frame). Then, formulation of traffic monitoring in the Kalman filter framework is presented, including state definition, motion model, and sensor model. After that, sensor fusion by grid-based method is introduced, followed by how non-Gaussian uncertainty is handled. Finally, the whole traffic information estimation process is summarized and comprehensively explained.

RL: CNN_DailyMail: chapter chapter . traffic monitoring by ir lidar . traffic monitoring system in intelligent system are expected to con . application. . stantly provide more informative and reliable traffic data compared with the conventional .

TIAN, Y. Self-Powered Intelligent Traffic Monitoring Using IR Lidar and Camera. Thesis, Virginia Tech, Feb. 2017. <http://hdl.handle.net/10919/74949>

Chapter 5

<p>Gold standard summary: A dynamic power management (DPM) approach is developed based on traffic flow behavior prediction, including the theory and realization in practice. First, the basic idea of how energy reduction is achieved in traffic monitoring through dynamic power management is introduced. After that, the working process is demonstrated, followed by the formulation of power state machine definition. Finally, the power policy of the power state manager is presented. The power policy is reflected through three power state transitions including inter-vehicle and inter-group considerations.</p>
<p>RL: CNN_DailyMail: chapter 5 . dynamic power management . since development of its requires large number of traffic monitoring systems installed . self-powered traffic monitoring systems are more preferred in .</p>

<p>TIAN, Y. Self-Powered Intelligent Traffic Monitoring Using IR Lidar and Camera. Thesis, Virginia Tech, Feb. 2017. http://hdl.handle.net/10919/74949</p>
<p>Chapter 6</p>
<p>Gold standard summary: The developed system prototype is presented with solar panel, sensor array, and base, also involves Hardware components (Lidar, camera, computing unit) installation and calibration. The system power state machine is described and its power consumption properties, with both Lidar and camera, measured and tested.</p>
<p>RL: CNN_DailyMail: chapter 6 . development . as a system realization of the proposed power-efficient traffic mon . built and tested in field. ” ments is the ments .</p>

<p>TIAN, Y. Self-Powered Intelligent Traffic Monitoring Using IR Lidar and Camera. Thesis, Virginia Tech, Feb. 2017. http://hdl.handle.net/10919/74949</p>
<p>Chapter 7</p>

Gold standard summary: Multiple simulations have been conducted to evaluate the effect of the three power state transition policies used for dynamic power management. To fully analyze all the policies, parametric study has been done in both day and night, busy and free road, close and far section from traffic lights. Based on the simulations, the power management strategy in the developed traffic monitoring system has shown to be able to reduce a decent amount of energy cost and still achieve reasonable detection accuracy by proper parameter setting. In power management based on congestion recognition, about 10% of energy cost is saved in sacrifice of only about 5% detection. Because multiple detection is triggered for each individual vehicle, such sacrifice is very close to a neglectable level. In power management based on inter-vehicle power state transition, by properly configuring service-requester, about 12% energy reduction is achieved in sacrifice of no detection missing. Power management based on inter-group state transition have various performance in different traffic condition. For example, its performance at night is much better than in daytime. And to achieve same amount of energy cost reduction, mostly more missing detection would happen.

RL: CNN_DailyMail: chapter 7 . results results . monitoring. in traffic . power consumption are made with the power state model in built in chapter . and using collected traffic data from the tests , simulations of system . in the past .

TIAN, Y. Self-Powered Intelligent Traffic Monitoring Using IR Lidar and Camera. Thesis, Virginia Tech, Feb. 2017. <http://hdl.handle.net/10919/74949>

Chapter 8

Gold standard summary: This thesis presented a reliable and power efficient self-powered traffic monitoring approach which is composed of sensor (Lidar and IR camera) and power supply components. Multiple techniques for traffic monitoring and Dynamic Power Management are proposed; and the accuracy and reliability of the system has been evaluated after multiple field tests. Three potential avenues for future work have been proposed which include adding an optical filter to reduce noise from unwanted noise sources, conducting an integrated testing for determining the overall efficiency of the derived power management strategy, and developing a network-level DPM for better service request time prediction and energy savings.

RL: CNN_DailyMail: run down 8.1 . this thesis has proposed a self-powered traffic monitoring approach . system is mainly composed of two components , sensor component and power supplying . major effort has been made on dynamic power . it includes a lidar array and an ir imaging .

NACIRI, W. M. Bug Finding Methods for Multithreaded Student Programming Projects. Thesis, Virginia Tech, Aug. 2017. <http://hdl.handle.net/10919/78675>

Chapter 1

Gold standard summary: Parallel programming is becoming ubiquitous with an increasing number of cores. Using multithreading, a performance speedup can be experienced due to concurrent execution of threads. Educators' efforts to improve curriculum related to threads can benefit from a special debugging tool to make it easier to program threads, that helps students to better understand bugs and provides a high level description relating to their cause. Past students had expressed difficulty working on fork-join framework; their feedback is a driving factor of the research. Existing debugging tools, such as Helgrind, focus strictly on data-races. They do not identify and describe the high-level root cause of bugs. Willgrind is a special-purpose debugging tool, that is built from scratch using the Valgrind framework, can directly detect bugs and provide high-level descriptions about their cause. WillgrindPlus is a tool that indicate if the student program is vulnerable to a bug that can manifest itself in a different execution. Both Willgrind and WillgrindPlus provide output through an interactive web interface. A user study was performed on Virginia Tech students to evaluate the effectiveness and usefulness of tools. A plethora of different bugs were detected in their submissions.

RL: CNN_DailyMail: modern day processors feature an increasing number of cores each . as a result . programming has become ubiquitous. . a thread is a unit of sequential execution that can be scheduled to a distinct . a key paradigm in parallel programming is multithreading . core. .

NACIRI, W. M. Bug Finding Methods for Multithreaded Student Programming Projects. Thesis, Virginia Tech, Aug. 2017. <http://hdl.handle.net/10919/78675>

Chapter 2

Gold standard summary: In divide and conquer algorithms, a problem is divided into many independent subproblems. These subproblems can be solved independently using a multithreading framework. The fork-join framework, such as for Java (with constructs like future, submit, get, and free) is efficient, simple, and provides regularity. It is taught through programming projects in computer science courses at Virginia Tech. If some threads become idle while others are working, that can reduce the performance of the framework. A work stealing strategy can be used to rectify this problem. To catch bugs, static and dynamic program analysis can be done. Since static program analysis can not catch runtime bugs, it is limited. Valgrind, a dynamic binary instrumentation framework, disassembles the client binary into an intermediate representation, instruments it, and re-assembles into machine code using dynamic binary. Valgrind runs as a single thread and the execution of client threads is serialized with, each thread being correctly abstracted and registered with the kernel.

RL: CNN_DailyMail: background . this provides background information to understand the concepts underlying . we assume the reader has basic knowledge of multi-threaded programming . 2.1 m rise ’

NACIRI, W. M. Bug Finding Methods for Multithreaded Student Programming Projects. Thesis, Virginia Tech, Aug. 2017. <http://hdl.handle.net/10919/78675>

Chapter 3

Gold standard summary: The shadow values contain useful information to identify bugs, making shadowing a common technique used by dynamic program analysis tools like Willgrind to detect bugs at run-time. Invariants are the conditions that must hold true during the correct execution of a program. Identifying invariant violations can be used to establish the correctness of a program. The run-time code and instrumentation code in Willgrind runs on the host CPU. While the function replacements run in the guest space. Deadlock is a difficult to detect situation where the system does not make progress because threads are blocked forever, such as two threads requesting each other’s locks. Willgrind provides accurate deadlock detection by leveraging program-specific knowledge. Since, visualizations speed up the debugging process, in Willgrind the bugs are reported through a friendly web interface.

RL: CNN_DailyMail: valgrind provides the low-level infrastructure to support . . we do n't know . the valgrind tool achieves its program . for the next game . discuss how the tool is implemented and its interaction with valgrind. .

NACIRI, W. M. Bug Finding Methods for Multithreaded Student Programming Projects. Thesis, Virginia Tech, Aug. 2017. <http://hdl.handle.net/10919/78675>

Chapter 4

Gold standard summary: WillgrindPlus extends Willgrind, also providing happens before based checking. It does not include semantic violations and deadlock. Happens-before violations indicate a latent failure in the execution. Willgrind has to be run several times to detect a bug; it does nothing when a bug is hidden by the scheduling, limiting its detection by the scheduler. WillgrindPlus rectifies this problem and leverages happens-before based checking to augment detection. Students only need to run the tool a minimal number of times to detect dormant bugs. Vector clocks, each assigned to a process, are used to check happens-before relationships of model future state transitions, ensuring proper thread synchronization exists between the state transitions. Each model future state transition is assigned a vector timestamp (VTS) in order to validate happens-before relationships between transitions. An adjacency matrix is used to represent the happens-before relationships and the Floyd-Warshall algorithm is used to add transitive happens-before relationships. Using lock-free programming, atomic operations are able to concurrently access memory without the use of locks. This influential standard must be considered when designing multithreaded applications. Datarace of WillgrindPlus must be suppressed to support concurrent access to an atomic done flag.

RL: CNN_DailyMail: valgrindplus . valgrind can only detect bugs that it observes in a given execution . we created valgrindplus , a separate tool , to address this problem . . it has all the features of the original tool but also provides happens . checking. .

NACIRI, W. M. Bug Finding Methods for Multithreaded Student Programming Projects. Thesis, Virginia Tech, Aug. 2017. <http://hdl.handle.net/10919/78675>

Chapter 5

Gold standard summary: Performance, effectiveness, and usefulness metrics were included in a user study in Computer Science at Virginia Tech to evaluate Willgrind and WillgrindPlus, comparing with Nullgrind and Helgrind – all four run under the Valgrind framework. Since the execution of threads in Valgrind is serialized, threads can be blocked for extended periods of time when waiting to run, causing performance degradation. To rectify this, the processor affinity of Valgrind should be set for all threads to run on a single core. The test suite for users is comprised of a medley of familiar divide-and-conquer algorithms and each algorithm is assessed with various sizes and thread counts. The results indicate that the overhead in Willgrind is primarily dominated by the Valgrind recompilation process. Since WillgrindPlus does not check for data-races, a performance improvement is possible by removing unnecessary vector clocks. Effectiveness evaluation to analyze the ability of Willgrind and WillgrindPlus to detect bugs was performed. After analyzing the anonymous code evaluation, a majority of respondents believe the tool definitely helped them detect at least one bug in their code. Additionally, none of the respondents said the tool definitely did not help to catch a bug. Overall, the survey indicated that the tool is important, useful, and credible to the students.

RL: CNN_DailyMail: injury injury . use three metrics : performance , effectiveness . irb 17-093 -lrb- irb 17-093 -rrb- . effectiveness evaluation assesses the bug . study on students enrolled in computer systems . the usefulness evaluation investigates how important the tool is for . virginia tech institutional review board .

NACIRI, W. M. Bug Finding Methods for Multithreaded Student Programming Projects. Thesis, Virginia Tech, Aug. 2017. <http://hdl.handle.net/10919/78675>

Chapter 7

Gold standard summary: An analysis tool was developed to make multithreaded programming easier for students. Although the tool gave successful results in the user study, there is some room for improvement. When detecting a deadlock, the tool only identifies the line number where the threads deadlock. Willgrind could track which locks are held to indicate the exact acquisition that caused the deadlock. WillgrindPlus could be enhanced to detect atomic variables for different memory consistencies.

RL: CNN_DailyMail: . 7.1 future . this research has demonstrated successful results in the user 's study. . new : there 's a nonetheless , nonetheless says .

MOLINARO, N. J. The Two Point Correlation Structure of a Cylinder Wake. Thesis, Virginia Tech, June 2017. <http://hdl.handle.net/10919/78296>

Chapter 1

Gold standard summary: The two-point correlation structure and turbulence statistics of a cylinder wake are studied in order to develop accurate prediction methods for an open rotor ingesting turbulence. Understanding wake flow is necessary for understanding the noise produced by a wake generator. Proper Orthogonal Decomposition is used to determine the optimum velocity profile that describes the shape of structures in flow. Two-point correlation functions are used to infer the characteristic eddy structures in each wake using the proper orthogonal decomposition. Comparisons between cylinder structures and airfoil turbulent wake flows will give insight into how and why different inflow conditions produce different sound fields when an open rotor ingests wake flows. Related literature explains the physics of the plane wake including the flow behind a cylinder, universality and self-preservation, and measurements of a NACA 0012 airfoil (studied by Devenport).

RL: CNN_DailyMail: missing . study describes two-point correlation structure of cylinder . the four-dimensional space-time correlation of the wake at the rotor disk location measured without the rotor installed . majority of the measurements were performed in the mid-wake region 20 diameters downstream . a major goal of the larger study is to develop more accurate prediction methods for an open rotor ingesting . it was made to provide the inflow boundary condition to a larger study , described by alexander et al. -lrb- 2016 -rrb- .

MOLINARO, N. J. The Two Point Correlation Structure of a Cylinder Wake. Thesis, Virginia Tech, June 2017. <http://hdl.handle.net/10919/78296>

Chapter 2

Gold standard summary: Measurement data was collected at the Virginia Tech Stability Wind Tunnel and the Virginia Tech Open Circuit Wind Tunnel. The first facility is unique in that it can be acoustically quiet without distorting the aerodynamics of the air flow. The model used to generate the wake under investigation in the present study was a machined aluminum circular cylinder with a smooth, near polished surface finish. A computer controlled three-dimensional traverse was used to position probes in the wake of the cylinder to measure wake profiles. The traverses are operated using Matlab code that sets the rake to a desired height in the test section and samples the pressure probes on the rake using an Esterline scanner.

RL: CNN_DailyMail: 2 : experimental setups . stability wind tunnel . the largest and most well-known is the virginia tech stability wind . the facility is a closed-loop subsonic wind tunnel with a maximum flow velocity of 80 m/s in the test section with no blockage. . it can be used for both aerodynamic and acoustic testing. .

MOLINARO, N. J. The Two Point Correlation Structure of a Cylinder Wake. Thesis, Virginia Tech, June 2017. <http://hdl.handle.net/10919/78296>

Chapter 3

Gold standard summary: The two-dimensionality of the cylinder wake was determined to be acceptable at both test locations and the normalized wakes were judged to be similar. More measurements were made in the open circuit wind tunnel than the stability wind tunnel; these were followed by shifting the measurement grid data, correcting for the angle sensitivity of the hotwire probes, and studying hotwire probe coherence. The two-point time delay correlation depends on three spatial coordinates, so quad-hotwire probes were used to measure the three components of velocity in each flow. The full measurement campaign consisted of 19 independent measurements, where each measurement had a unique fixed probe position. Cylinder wake flow was shown to be substantially more turbulent than the airfoil wake flow, while supporting a very similar mean flow. The two-point correlations showed that structures in the cylinder wake remain coherent to longer time delays and probe separations than those present in the airfoil wake. This suggests that an open rotor ingesting the cylinder wake will produce a very different sound profile than a rotor ingesting an airfoil wake.

RL: CNN_DailyMail: missing . first measurements performed in present study first took place in the stability wind tunnel . stability wind tunnel . single point statistics and spectra were used to compare with the results from the two-point measurement . profiles of the mean velocity and the reynolds stress profiles were measured using quadhotwire probes . in the wind tunnel a two-inch diameter cylinder was positioned in the test section and profiles were measured 10 , 15 and 20 diameters downstream of the cylinder wake .

MOLINARO, N. J. The Two Point Correlation Structure of a Cylinder Wake. Thesis, Virginia Tech, June 2017. <http://hdl.handle.net/10919/78296>

Chapter 4

Gold standard summary: To provide a boundary condition for a larger study, single point measurements were performed in the Virginia Tech Stability Wind Tunnel and Open Circuit Wind Tunnel to document the full two-point correlation tensor of the cylinder wake. The comparisons between Reynolds stress profiles measured in both cylinder wakes and the airfoil wake show that the cylinder wake is substantially more turbulent than the airfoil wake. The cylinder wake is better correlated at larger separations and time delays than the airfoil wake, suggesting that there are stronger and more coherent eddy structures in the cylinder wake. Cylinder and airfoil wake flows show some significant differences in the flow structure. Further investigation is needed to assess how these differences in the flow structures will influence the predicted sound profiles computed using the cylinder and airfoil two-point correlation functions.

RL: CNN_DailyMail: missing 11 . study has described the two-point correlation structure of a cylinder . the four dimensional correlation in the cylinder wake for use in a larger study where the sound radiated by an open rotor . the majority of the wake measurements took place at a location in the mid-wake region 20 diameters downstream . single and two point measurements were performed on an untripped cylinder based on the cylinder diameter and freestream velocity of 60 .

DELLINGER, E. A. "The Pattern is Movement": Images of Timelessness and Patterns of Response in T.S. Eliot's Four Quartets. Thesis, Virginia Tech, June 2017. <http://hdl.handle.net/10919/78299>

Chapter 1

Gold standard summary: T.S. Eliot's poem 'Burnt Norton and Reflected Light' which originated from his 1934 visit to an old and burned manor house, explores temporal existence and the search for a meaning, sensed but not understood, outside the boundaries of human finitude, through the lens of motion, both linear and non-linear. Initially, the notion that the mind is capable of viewing time with perpetual possibilities is discussed - the idea of 'what could have happened'. The idea of a rose garden is used to describe this notion; wherein this garden is thought to be inspired by the Garden of Eden. This garden is intended to symbolize time's denials and contradictions. The poem then describes the idea of searching for the 'heart of light'. Then, ways to escape linear time after exile from the rose garden are illustrated, into the outside world that has been entrapped by time. The poem then descends into a different realm - using the analogy of an underground metro that is dimly lit and aims to create a contrast between the previously explored shadowy unreality of "time-ridden" lives. Further, the poem talks about returning back to the surface, but a black cloud carries the sun away. The transience of words and music (which are also in motion) is also illustrated. The rose garden and the vision of the 'heart of light' that was earlier visited are glimpsed again. Through a set of images, Eliot guides the reader into the beginning of a search for visions of reality's light.

RL: CNN_DailyMail: chapter 1 : burnt norton and reflected light . . poem. . the first ten lines of part i meditate on the interrelated nature of the different aspects . time. .

DELLINGER, E. A. "The Pattern is Movement": Images of Timelessness and Patterns of Response in T.S. Eliot's Four Quartets. Thesis, Virginia Tech, June 2017. <http://hdl.handle.net/10919/78299>

Chapter 2

Gold standard summary: T.S. Eliot's second poem of the Four Quartets is 'East Coker and the Dance'. While 'Burnt Norton' gives a glimpse outside the linear veneer of time, it presents the problem, of making time stretch before and after, seem to be a waste of time. This poem, East Coker, responds to the problem by delving into this expanse of time before and after, probing into the ridiculousness and seeming endlessness of human limitation in the face of such a moment of vision. It further questions whether existence in time negates the potential of meaningfulness. This question is explored using the image of a dance, which gracefully ties together the motion of time and the stillness of waiting into the search for meaning. Eliot ponders over the cyclical nature of life with its perpetual beginning and ending. He also forces the reader to acknowledge the darkness that surrounds everyone and how in this darkness, the 'wisdom of humility' can be found. The poem then discusses the silence of the edges of existence and perception where everything is dark and where even knowledge cannot illuminate this darkness. Thus, what seems like an end, the end of being able to see after entering the darkness, is a part of the dance, and therefore a beginning.

RL: CNN_DailyMail: no injuries . east coker and the dance are east coker . eliot goes back to his beginning , making “ a journey into a remote past ” the village of somerset , from which his ancestors originated in the village , originated in before . emigrating to the new world in 1669 -lrb- gardner 's composition 42 -rrb- .

DELLINGER, E. A. "The Pattern is Movement": Images of Timelessness and Patterns of Response in T.S. Eliot's Four Quartets. Thesis, Virginia Tech, June 2017. <http://hdl.handle.net/10919/78299>

Chapter 3

Gold standard summary: T.S Eliot's third poem from the Four Quartets is 'The Dry Salvages and the Clanging Bell'. The previous poem 'East Coker' gives a response to humanity's position within the 'waste sad time,' which leads to the vision of a dance that draws time and timelessness together into meaning. This poem presents a response to this problem on a larger scale. It develops the image of the sea that was illustrated at the end of East Coker more fully. Memories that were significant to Elliot are translated into an image of a sea of time that is incomprehensibly vast, empty, and endless which contrasts the imagery of a river that is 'knowable, bridgeable, and comprehensible'. Eliot further emphasizes the need to fight and continue seeking meaning despite the inevitability of failure in the chaos of the sea. Similar to the previous poems, the intersection outside reality with the limited realm of humanity warrants the need for a response, the drive to "fare forward." The reflected light and dance of the prior two poems, and the clang of the bell here, all are echoes of the Incarnation, pointing to deeper meaning in the midst of exile, darkness, and chaos.

RL: CNN_DailyMail: no injuries reported . eliot begins his image of time in the dry not with the sea . the dry salvages and the clanging bell bell bell and the clanging bell bell bell bell and the clanging bell bell bell bell bell bell bell bell bell new book : ' we do n't do so ? ' do not know much about gods , but i think that the river is / is a strong brown god. . the river gives him a sense of self-consciousness , an awareness of humanness .

DELLINGER, E. A. "The Pattern is Movement": Images of Timelessness and Patterns of Response in T.S. Eliot's Four Quartets. Thesis, Virginia Tech, June 2017. <http://hdl.handle.net/10919/78299>

Chapter 4

Gold standard summary: The last poem from the Four Quartets is ‘Little Gidding.’ It echoes many of the images and ideas found throughout the previous three poems. Within this final poem, Eliot is able to develop a way of approaching the problem of meaning that is both unique to Little Gidding and, at the same time, ties the whole of Four Quartets together in a sense of conclusion and finality. Eliot describes the paradoxical notion of “frost and fire” wherein the frost describes that everything is covered with ice and fire represents “Pentecostal fire”. This image of the “Pentecostal fire” appears near the very beginning of the poem, and it is in the descent of these divine flames into the human world that the other images are tied together and transformed. The response the poem enacts is both the same pattern, and the pattern made new, as the searching in exile of Burnt Norton, the waiting in the darkness of East Coker, or the faring forward on the sea of The Dry Salvage. Here it is a response of embracing renewal and transfiguration by means of fire and purification through the presence of the Pentecostal dove wreathed in flame. Thus, the language and vision of each of the four poems give a different way to understand the search for deeper meaning, tied together in a journey of response that leads us back to the beginning to find we “know the place for the first time.”

RL: CNN_DailyMail: no injuries . gidding and transforming fire . each of the previous three poems. . little gidding opens with a landscape . “ midwinter spring ” is the backdrop for the scene. . alcohol .

ROTH, H. M. Smartphone Privacy in Citizen Science. Thesis, Virginia Tech, July 2017. <http://hdl.handle.net/10919/78360>

Chapter 1

Gold standard summary: Privacy concerns influence acceptance of citizen science, which relates to crowdsourcing, crowdsensing, and groupsensing. This study discusses a potential solution to privacy concerns in Android devices, i.e., a cryptographic group signature scheme. A group sensing prototype GROUPESENSE was developed which supports anonymous-yet-accountable crowdsensing in Android devices. A user study was conducted to improve the application, evaluating usability, understanding of the privacy guarantees of group signatures, and whether those would alleviate privacy concerns among citizen science participants.

RL: CNN_DailyMail: introduction . process of eliciting data collection from the general public . no injuries . and a few key terms are defined as follows . 2. . the process of data collection from devices or sensors .

ROTH, H. M. Smartphone Privacy in Citizen Science. Thesis, Virginia Tech, July 2017. <http://hdl.handle.net/10919/78360>

Chapter 2

Gold standard summary: Related work and background issues are discussed about crowdsensing platforms, group signatures, threat models, security and privacy goals, and Android mobile computing. Crowdsensing platforms include various architecture components, like group manager, data collector, data obfuscator, MIX network, sensors, and data collection server. They support particular operations like recruitment, task assignment, data submission, revocation, and reward distribution. Using group signature scheme, platform supports anonymous-yet-accountable group sensing. Under threat model, three categories of threats, Data forgery, Identity forgery & Honest data collector are identified and addressed through three security and privacy goals, Accountability, Identity Unforgeability, and Sensing-time Anonymity. Android mobile computing discussed the advantage of Crowdsensing in terms of being cost-effective, perpetuate possibilities of tracking and highlighted the significance of adherence to a systematic and disciplined approach to user security.

RL: CNN_DailyMail: background . 2.1 crowdsensing . an open platform that is unregulated exposes itself to malicious and erroneous participation. . open crowdsensing platform where anyone can submit data is undesirable as a portal for trans - ferring sensitive . this constitutes a vulnerability which threatens privacy , data in - tegrity , and reliability standards -lsb- 56

ROTH, H. M. Smartphone Privacy in Citizen Science. Thesis, Virginia Tech, July 2017. <http://hdl.handle.net/10919/78360>

Chapter 3

Gold standard summary: An in-person user study had 22 student participants working with an Android device for 15 minutes using a crowdsensing application, in addition to other use of the device for usual and customary activities. After the user study, a survey gathered demographic information (age, gender, technical background) and had 7 questions (with quantitative responses plus optional comments) about privacy concerns, citizen science, and features of the Android application. It is suggested that participants generally view privacy as important; 82% of participants were willing to install the application on their smartphone.

RL: CNN_DailyMail: study found by user study user user . 3.1 study design for a 3.1 study . user studies are essential catalysts to the evaluation process by eliciting and disseminating feedback from potential . a total of 22 students participated in the user 's study . . an institutional review board study was conducted in person to evaluate the usability of our privacy-preserving crowdsensing . these studies can be conducted through physical , remote , or crowdsourcing mechanisms . both undergraduate and graduate students at virginia

ROTH, H. M. Smartphone Privacy in Citizen Science. Thesis, Virginia Tech, July 2017. <http://hdl.handle.net/10919/78360>

Chapter 4

Gold standard summary: The Crowdsensing Android Application collects data from sensors including accelerometer, gravity, gyroscope, linear accelerometer, magnetometer, and rotation. The original interface showed battery life as well as sensing status (stopped, paused, sensing) and had related buttons. Building upon the user study, requirements, design, and implementation of a new user interface led to notifications and more button displays, indicating collecting, signing, or sending data to the data collector.

RL: CNN_DailyMail: crowdsensing android ” 4.1 what does the application do ? when the user clicks the “ start sensing ” button on the home page . the most important contribution is the privacy . on the current prototype , the data is collected but not actually stored to device. . collecting data on the audio sensor also an option , but it was not operational. .

ROTH, H. M. Smartphone Privacy in Citizen Science. Thesis, Virginia Tech, July 2017. <http://hdl.handle.net/10919/78360>

Chapter 5

Gold standard summary: GROUPESENSE, crowdsensing prototype with Android support, which elevates risks, limitations, and constraints associated with SRBE is proposed with the capability to expand to meet the needs of any group sensing application. It was developed and evaluated through a user study targeting whether the application, through its security features, obviates the privacy concern among participants. Based on findings, modifications were made to the application which includes additional screens and a sophisticated notification system. This work is significant with respect to security as it preserves the movement of provable secure group signatures closer to practical deployment. In future work, an additional user study is suggested with enhancements like a diversified group of respondents, with the difference in their scale and scope. In terms of Application Modifications, a performance boost, changes in the interface in form of a dashboard, financial exchange application, and identity management practices are suggested. It is also highlighted that large-scale crowdsensing applications require more focused efforts in security and privacy as existing privacy-preserving authentication protocols are inadequate.

RL: CNN_DailyMail: conclusion & future . 5.1 future and 5.1 . study by 5.1.1 additional user . one area for future work is the scale of the user 's study. . a study should be conducted on the revised application to measure the effectiveness and user response to the interface modifications and feature a similar sampling of users , using a consistent selection criteria , should be deployed to achieve reliable measurement outcomes . participants from the first user study should be asked to participate in the follow-up user study. study . the members of group three should demonstrate an improved understanding of the privacy guarantees in order to prove that the modifications were effective. .

PINTO, S. RTL Functional Test Generation Using Factored Concolic Execution. Thesis, Virginia Tech, July 2017. <http://hdl.handle.net/10919/78397>

Chapter 1

Gold standard summary: Rapid test generation at a high level of design abstraction, such as the Register Transfer Level (RTL), used by engineers to implement hardware (electronic circuit) specifications, can aid validation of hardware designs. In this domain, Sen coined the term concolic execution (a portmanteau of concrete and symbolic) based on engaging classical symbolic execution over concrete execution paths from testing with concrete inputs. CORT (Concolic RTL Test Generator), a new test generation framework, was designed for rapid generation using a new methodology of systematically growing a new type of test decision tree (TDT) over short explorations of highly efficient cycle-by-cycle concolic execution. The novel methodology aids the automation of testing functional level hardware description with the aim of maximizing branch coverage. CORT's advantages were demonstrated by generating high-branch coverage tests for the ITC99 and IWLS-2005 benchmarks. Further, its tests were smaller, and generation faster, than other approaches.

RL: CNN_DailyMail: introduction . hardware design validation consumes as much , or more , resources than design . rapid test generation for functional metrics can aid validation . commonly used metrics are akin to their software testing counterparts . metrics ' the go-to standard approach of constrained random test generation is proving to be unsuitable for achieving high functional coverage. .

PINTO, S. RTL Functional Test Generation Using Factored Concolic Execution. Thesis, Virginia Tech, July 2017. <http://hdl.handle.net/10919/78397>

Chapter 2

Gold standard summary: Improving the validation of hardware design builds upon automated functional test generation, concolic execution, scaling through factored exploration, use of Verilator, and Register Transfer Level (RTL) instrumentation. Due to differences between Hardware Description Languages (HDLs) and software languages, where many testing approaches have had good success, new approaches are needed for RTL test generation, such as hybrids of constraint-based and search-based techniques. Concolic execution explores a tree of possible execution paths and yields a concrete execution trace; tests are generated corresponding to the leaf nodes in the response tree. Scaling the concolic execution is aided by factoring the exploration into smaller tests and obtaining the initial values of signals through instrumentation, each time bringing the system away from the initial state. Measuring branch coverage is done automatically by Verilator, an open source transpiler (source-to-source compiler), which automatically instruments the source code. Related work includes HYBRO, an RTL directed test generator that symbolically executes the concrete trace extracted from the design Control Flow Graph (CFG), PACOST, that uses factored explorations, and BEACON, with dynamically calculated branch coverage based heuristics.

RL: CNN_DailyMail: background . we explain fundamental concepts and terminology that forms our work. . task of hardware design is growing analogous to software . automated functional test .

PINTO, S. RTL Functional Test Generation Using Factored Concolic Execution. Thesis, Virginia Tech, July 2017. <http://hdl.handle.net/10919/78397>

Chapter 4

Gold standard summary: Concolic execution on its own is hindered by the limitations of path explosion and computational effort of evaluation over a large number of cycles. The entire Control Flow Graph (CFG) of the design is processed every cycle. Factoring the exploration into a smaller number of cycles and combining the results of each exploration offers a promising avenue to scale the test generation. CORT (Concolic RTL Test Generator), employs a novel methodology for RTL directed test generation that aims to maximize branch coverage with a minimal number of test vectors, in the shortest amount of time. The test generation problem is treated as a task of iteratively building the global Test Decision Tree (TDT) for the design over each exploration. Key is the paradigm of the Test Decision Tree, along with its construction and interpretation. The CORT framework includes preprocessing, concolic execution engine, test generation, and systematic exploration. Evaluation through experimentation considers branch coverage and the effects of exploration length.

RL: CNN_DailyMail: factored ” concolic execution on its own is hindered by the same limitations of path explosion and computational eort of evaluation . as demonstrated in -lsb- 32 -rsb- , factoring the exploration into a smaller number of cycles . the test generation problem is a task of iteratively building the global test decision tree -lrb- tdt -rrb- .

PINTO, S. RTL Functional Test Generation Using Factored Concolic Execution. Thesis, Virginia Tech, July 2017. <http://hdl.handle.net/10919/78397>

Chapter 5

Gold standard summary: A novel concolic execution methodology for the Register Transfer Level (RTL) is proposed, demonstrated through CORT, a factored concolic execution based test generation technique for the Register Transfer Level. Experimental results show that CORT generates smaller tests with high branch coverage, faster than existing hybrid semi-formal methods. Future work could include improving performance by recoding CORT from Python into C++, converting the C++ RTL to Static Single Assessment (SSA) form, and modifying Verilator to improve its capabilities.

RL: CNN_DailyMail: . limitations and future work and work work . in our work , the concrete values of variables can only be read between , not during . it is reported to the user . if a variable is used in a statement between two blocking denitions of the same variable , then no valid -lrb- pre/post cycle -rrb- concrete values can read for