Collection Management

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Outline

■ Goals & Data Flow
■ Incremental update
■ Tweet cleaning
■ Webpage cleaning
Goals

- Keep data in HBase current
- Providing “quality” data
  - Identify and remove “noisy” data
  - Process and clean “sound” data
  - Extract and organize data
Data Flow Diagram

Image credit: Sunshin Lee
Incremental Update
Incremental Update: MySQL → HDFS

- Previous bash script importing 700+ tables, without incremental feature.
- Incremental import new rows in the relational database (MySQL) to HDFS.
- Use *incremental append* mode of Sqoop to import data incrementally.

```bash
sqoop import
   --connect jdbc:mysql://mysql.example.com/sqoop
   --username sqoop
   --password sqoop
   --table visits
   --incremental append
   --check-column id
   --last-value 1
```

Incremental Update: HDFS $\rightarrow$ HBase

- Keep HBase in sync with imported data on Hadoop.
- Write Pig script to import new data from HDFS to HBase.
- Use job scheduler *Cron* on Linux (by creating *crontab* file), periodically run the Pig script.

![Cron Tab](http://itekblog.com/wp-content/uploads/2013/03/crontab.png)
Tweet Cleaning
Tweet: Text Cleaning and Info Extraction

- Remove URLs, profanities, and non-characters from raw tweets.
- Extract short URLs from raw tweets, expand, and map to corresponding web pages.
- Extract hash tags (#) and mentions (@) out from raw tweets.
- Store cleaned text, extracted hash tags and mentions from HDFS node to HBase.
- All the cleaning, extracting and storing process done by Pig Latin.

<table>
<thead>
<tr>
<th>rowkey</th>
<th>clean_tweet</th>
</tr>
</thead>
<tbody>
<tr>
<td>collection # - tweet id</td>
<td>clean_text</td>
</tr>
</tbody>
</table>
Tweet: Text Cleaning and Info Extraction (Example)

Raw tweet on HDFS

<table>
<thead>
<tr>
<th>Hbase(main):001:0&gt; get 'ideal-cs5604s16', '541-552940627672174595', {COLUMNS =&gt; 'clean_tweet'}</th>
</tr>
</thead>
<tbody>
<tr>
<td>COLUMN</td>
</tr>
<tr>
<td>clean_tweet:clean_text</td>
</tr>
<tr>
<td>clean_tweet:collection</td>
</tr>
<tr>
<td>clean_tweet:empty</td>
</tr>
<tr>
<td>clean_tweet:hashtags</td>
</tr>
<tr>
<td>clean_tweet:urls</td>
</tr>
<tr>
<td>clean_tweet:mappings</td>
</tr>
<tr>
<td>clean_tweet:mentions</td>
</tr>
<tr>
<td>clean_tweet:urls</td>
</tr>
</tbody>
</table>

8 row(s) in 0.1300 seconds

Cleaned tweet and extracted info in HBase
Webpage Cleaning
Webpage Cleaning Rules

- Remove Non-ASCII characters
- Keep English text only
- Extract URLs
- Remove profane words
Libraries/Packages

- BeautifulSoup4
  - Parse text out of HTML and XML files
- Readability
  - Pull out the title and main body text from a webpage
- Langdetect
  - Detect language of a text using naive Bayesian filter
- Re
  - Provide regular expression matching operations
### Cleaned Webpage Schema

<table>
<thead>
<tr>
<th>Rowkey</th>
<th>clean_web</th>
</tr>
</thead>
<tbody>
<tr>
<td>URL</td>
<td>collection</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rowkey</th>
<th>clean_web</th>
</tr>
</thead>
<tbody>
<tr>
<td>URL</td>
<td>urls</td>
</tr>
</tbody>
</table>
Three Christian universities gained allies Monday in their battle against Obamacare. Among their supporters: 16 state governments. Those states, along with a handful of other religious rights organizations, filed friend-of-the-court briefs to the Supreme Court supporting Houston Baptist University, East Texas Baptist University, and Westminster Theological Seminary. Those school have appealed the Supreme Court to overturn a circuit court ruling that forces them to expand contraception options in their health insurance plans. The Becket Fund for Religious Liberty, the school's legal counsel, said the briefs are a major breakthrough. This strong show of support for HBU, ETBU (and Westminster Theological Seminary) demonstrates just how important it is that the Supreme Court address the impact of the HHS mandate, particularly on religious groups, said Diana Verm, Legal Counsel at the Becket Fund, in a statement. It is especially significant that the 16 state governments are supporting HBU and ETBU at the Supreme Court. The case directly challenges the. th Circuit Court that ruling said that the schools were forced to offer all 14 types of contraception spelled out in the HHS mandate of Obamacare within their health insurance plans. The schools only offered 10 types. They say that the mandate violates their religious freedom. According to the statement, all three schools would have to pay millions in IRS fines if they aren't allowed exemption. The Becket Fund identified the 16 states to FoxNews.com: as: Alabama, Arizona, Florida, Georgia, Kansas, Louisiana, Michigan, Montana, Nevada, Ohio, Oklahoma, South Carolina, South Dakota, Texas, Utah, and West Virginia. Other organizations that pledged support include the Ethics and Religious Liberty Commission of the Southern Baptist Convention, the International Mission Board of the Southern Baptist Convention, the Christian and Missionary Alliance Foundation, and all 181 members of the Council of Christian Colleges and Universities. Today, strong support is an indication that the Court is likely to decide in the upcoming term whether religious ministries, like religious for-profits, will receive protection from the mandate, the statement said. Verm told FoxNews.com that many businesses have been exempted from the mandate, and that all religious institutions should be afforded the same opportunity. "The Supreme Court has already issued five preliminary orders in favor of religious organizations facing this choice, and we expect it to protect HBU and ETBU as well," she said. FoxNews.com's Matt Fossen contributed to this report.
Future work

- Clean big collection
- Clean documents with multiple languages
- Automating webpage crawling and cleanup
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Thank You!