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Summary

- Detect parking lots in satellite images
- Acquire and label large set of satellite images
- Train Faster R-CNN model for detection
- Build Python script to use model to output GeoJSON
- Several iterations of trial and error
- Research methods of improving model
Final Dataset

- 3,000 images from Las Vegas, Paris, and Shanghai
- ~500 labelled images
- Labelled using LabelImg
- Can only label along vertical and horizontal axes
- Difficulty labelling certain images
Testing

First Training Run

Second Training Run
Final Training Statistics
Results

First Training Run

Final Training Run
Deliverable

Python script for detecting parking lots

1. Convert geoTIFF to JPG
2. Run JPG on model -> return bounding boxes
3. Use GDAL to extract geographic information
4. Convert bounding boxes to GeoJSON

```
origin = getOrigin (dataset)
pixel_size = getPixelSize (dataset)

return x * pixel_size [0] + origin [0], y * pixel_size [1] + origin [1]
```
Accomplishments

- Detection of parking lots
- Decent accuracy when the parking lots are not tilted
- Doesn’t detect parking lots in negatives
- Large stockpile of training data
- Documentation for improving model
Lessons Learned

- **Machine learning is really difficult - several headaches**
- Failure is OK, led to our eventual success
- Research models before labelling data
- Setting up the infrastructure is difficult
- Prioritize good quality deliverable over stretch goals
Future Improvements

● Adjust parameters and checkpoints
● Build bigger dataset
● Train on VT ARC for faster iterations
● **Relabel and train with rotated bounding boxes**
  ○ We have documented steps how to do this
Acknowledgement and References

Client: Reinventing Geospatial - Mary Carome, Steven Lander and Mike Szaszy.

References:

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