

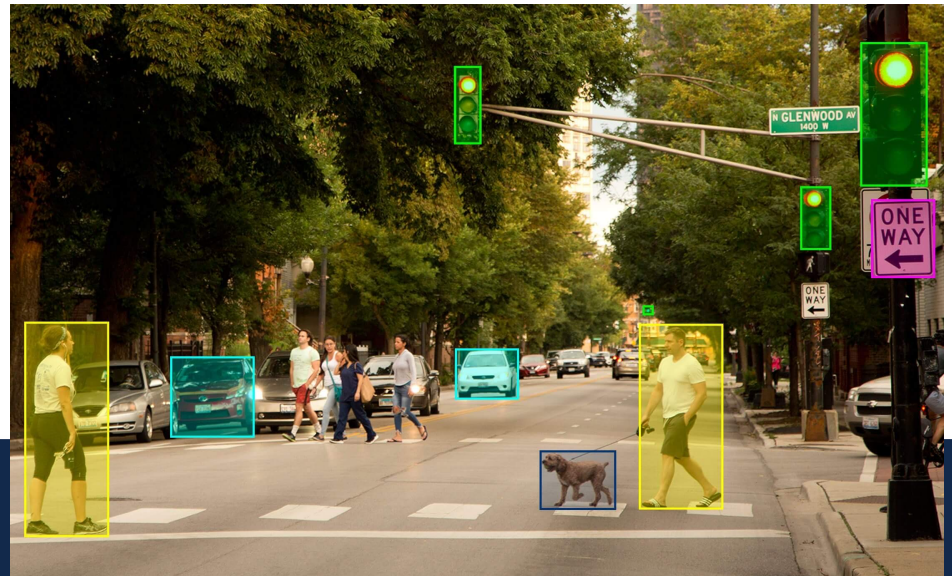
Leveraging computer vision for vehicle classification

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Motivation

GEOINT applications - often need to identify vehicles from poor quality data

Most computer vision algorithms focus on high quality street level data

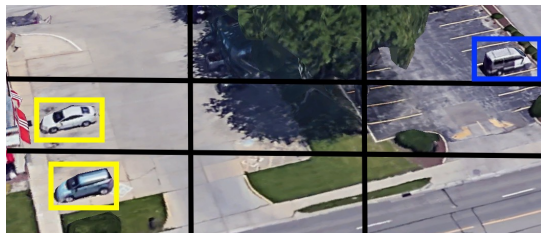


Literature Review – Computer Vision Algorithms

- Conventional Approaches:
 - SIFT, HoG
- Modern Approaches:
 - R-CNN, Fast R-CNN, Faster R-CNN

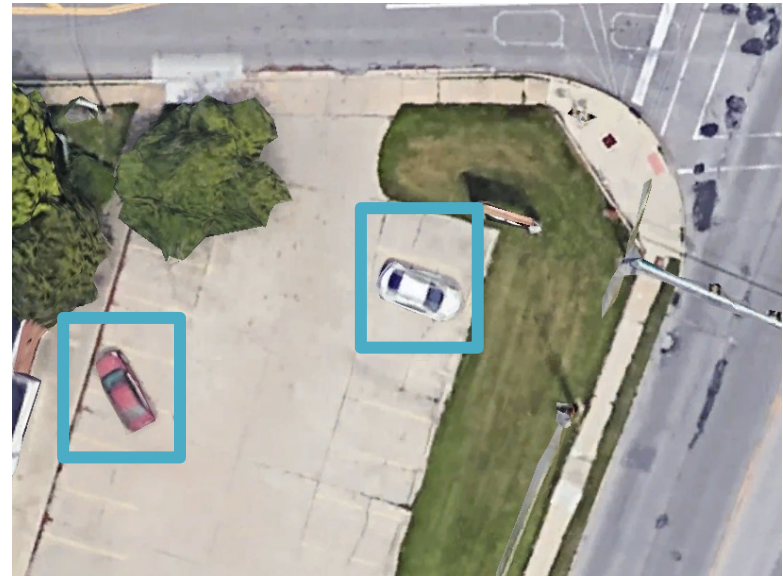
Literature Review – Computer Vision Algorithms

- Conventional Approaches:
 - SIFT, HoG
- Modern Approaches:
 - R-CNN, Fast R-CNN, Faster R-CNN
 - YOLO



Approach - Dataset

- More than 2000 vehicles classified in over 500 images obtained from Google Earth manually

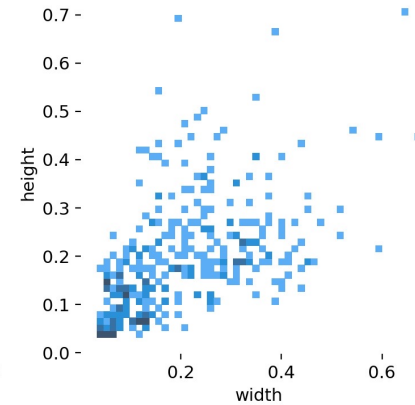
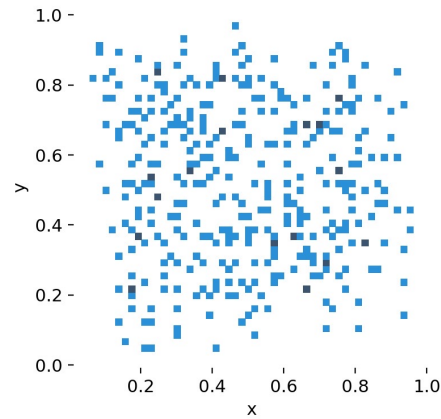
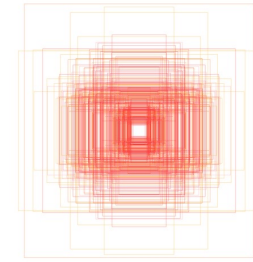
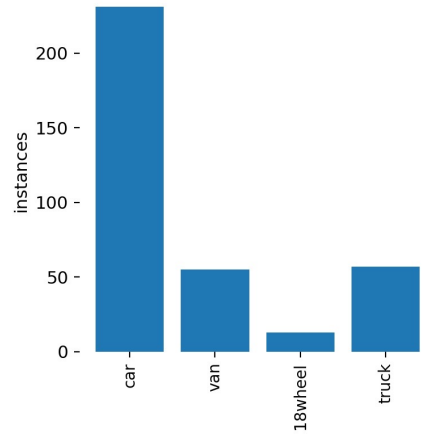


Approach - Algorithm

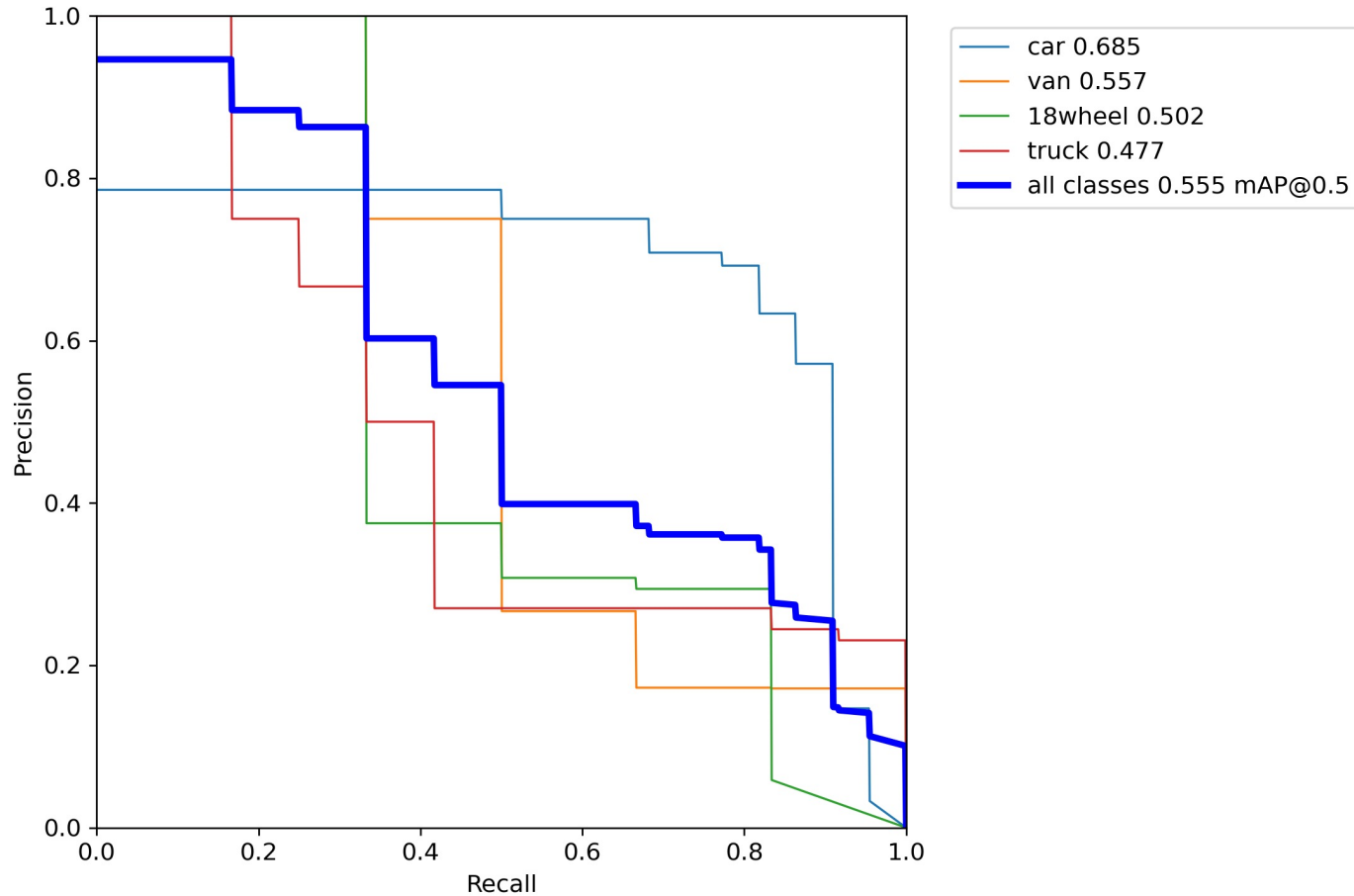
- Purely YOLOv5 selected for first evaluation
- Number of epochs optimized
- Used to identify deficient areas before incorporating other algorithms

Results

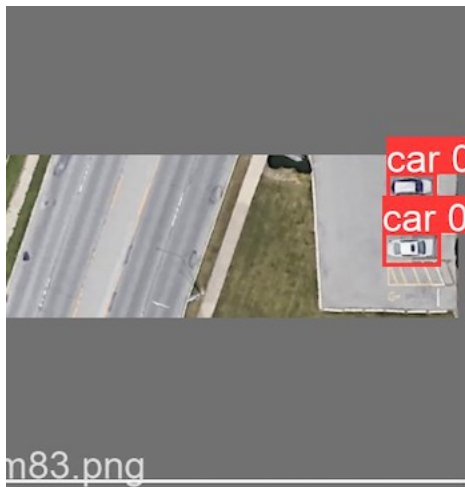
- 300 epoch run



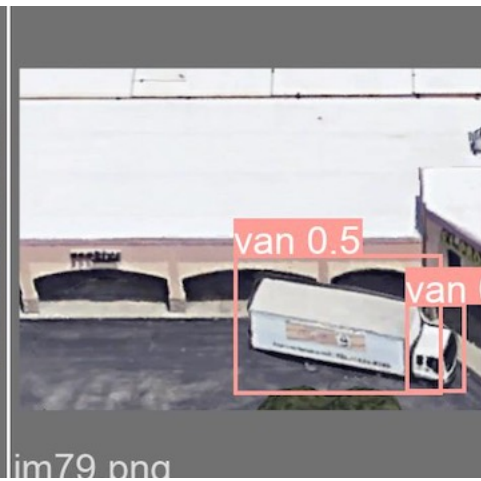
Results- Precision-Recall Curve



Results



Results



Conclusions

- Strong need for combination of algorithms
- Better dataset needed including blurrier images
- Poor quality data shows some promise using current algorithms; can do even better with transfer learning and other approaches
- Need to improve hyperparameter tuning

Questions?

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