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Conure ML Test Analysis Report

Model

I have used the pretrained Yolo version 5 model ultralytics/yolov5: YOLOv5 🚀 in PyTorch > ONNX > CoreML > TFLite (github.com), and further trained it on PKLot PKLot Dataset (roboflow.com). Due to limitation of resources and time constraint, I have only further trained the yolo v5 for 5 epochs with batch size as 8.

Dataset

The PKLot dataset contains 12,416 images of parking lots extracted from surveilance camera frames. There are images on sunny, cloudy, and rainy days and the parking spaces are labeled as occupied or empty. We have converted the original annotations to a variety of standard object detection formats by enclosing a bounding box around the original dataset's rotated rectangle annotations.

Results

Custom Image Results

Input Images

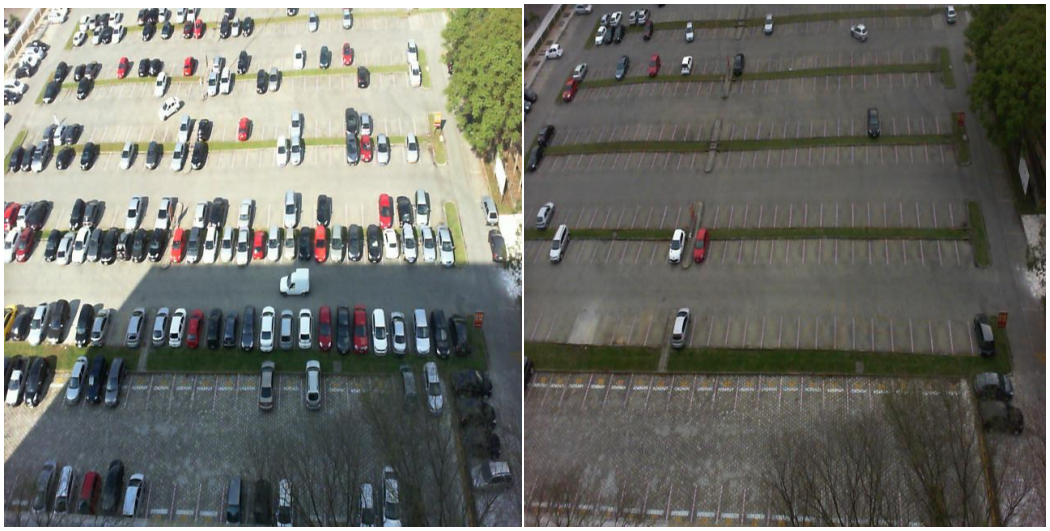

Figure 1: Train 1 and 2

Figure 2: Val 1 and 2

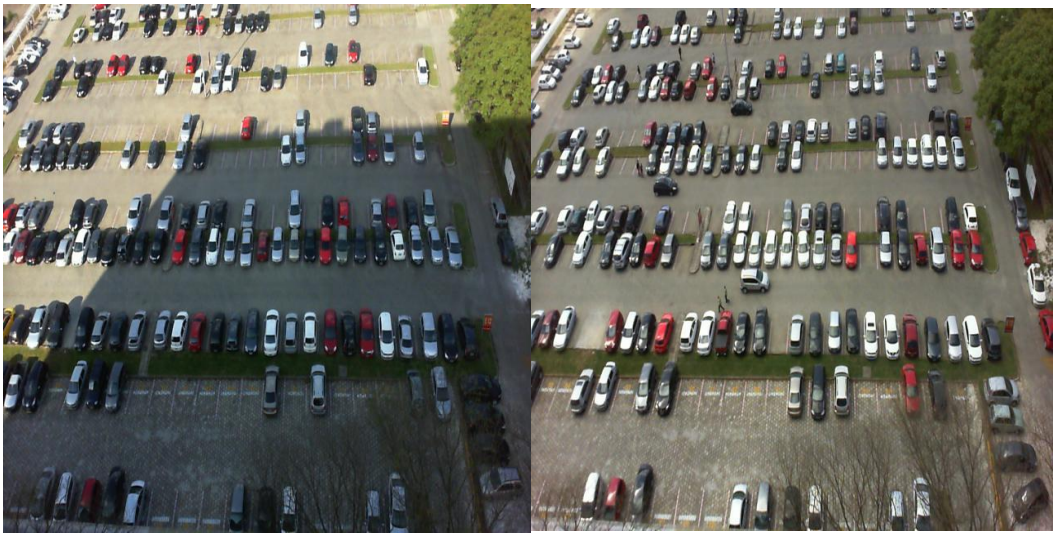

Figure 3: Test 1 and 2

Output Image

Figure 4: Train Image Output 1 and 2

Figure 5: Val Output 1 and 2

Figure 6: Test Output 1 and 2

Pretrained + MKLot Trained Model Output during Training

Figure 7: Train Batch 01

Figure 8: Train Batch 02

Given Sample Image

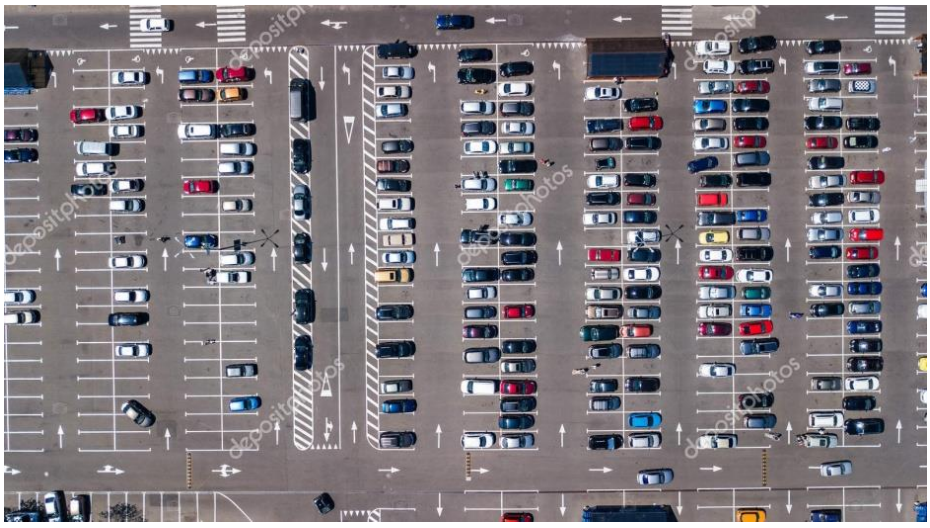

Figure 9: Given Sample Image

The model was not able to detect parking space in the given sample image in this particular orientation. However, after changing the orientation of the image i.e. rotating the image, and dividing the image into two images, the model was able to detect significant parking spaces.

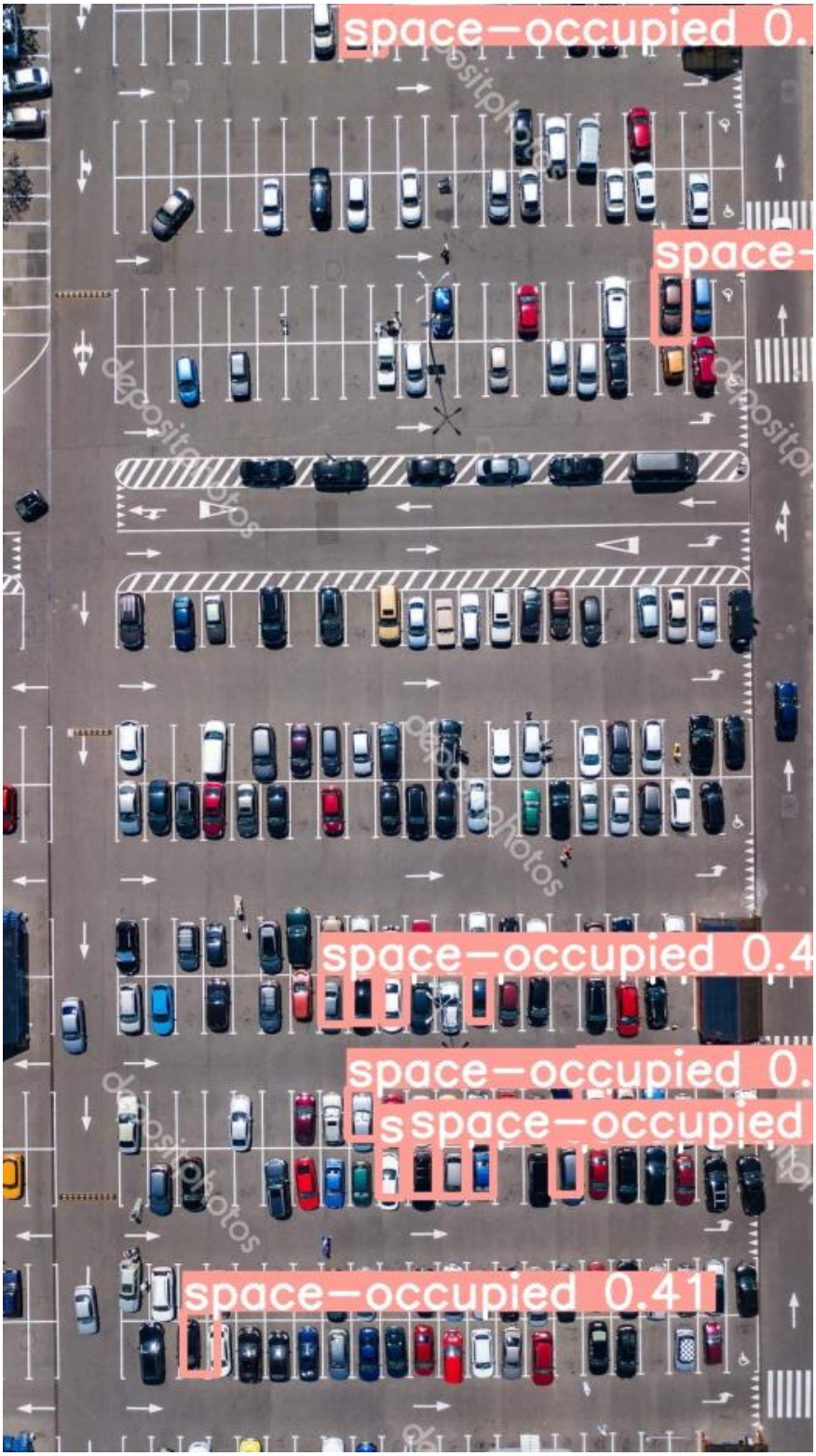

Figure 10: Output after rotating the sample image by 90 degrees

As Figure 10, shows that some parking spaces are detected just after rotating the given image by 90 degrees.

Figure 11: Sample Image Half 1 and 2

Figure 12: Output Sample Image Half 1 and 2

As Figure 12 shows that almost all the parking space are detected.

Further Observations

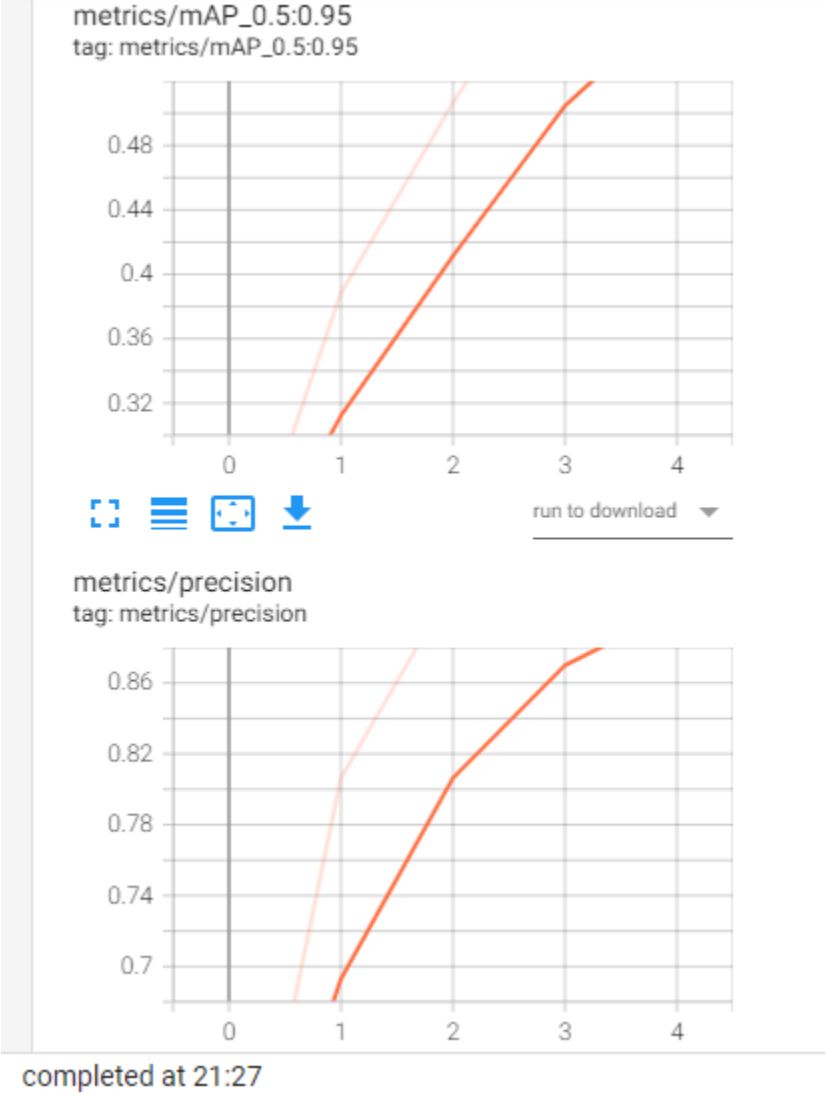

Figure 13: Tensorboard Output of Precision and mAP

As the graph of precision and mean accuracy clearly shows that there is ample room for the improvement for aerial parking space detection.