

CS 276A / STATS M231 Project 3

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1 Single-class object detection in one image

Use pre-trained Fast R-CNN model to do object detection in one example image. You need to carefully select the threshold of probability that a RoI is accepted as a detection. Only output the detection of car class. Plot the number of detections in the image over the value of threshold. Report your finally chosen threshold. Visualize the detected bounding boxes and the corresponding probability score of every bounding box in the image.

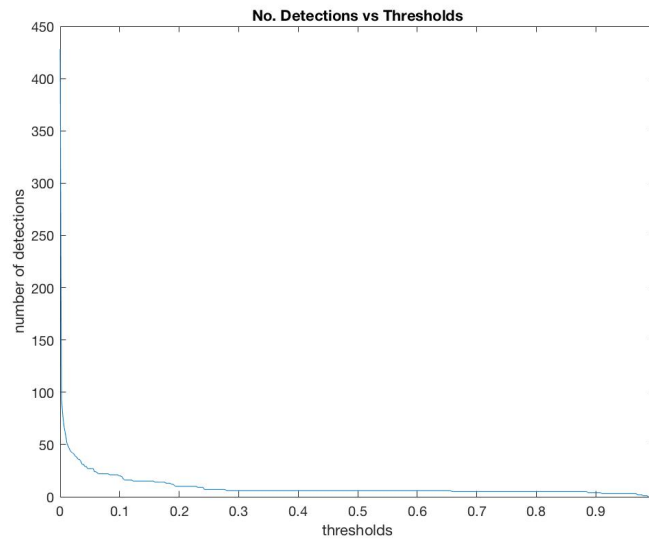


Figure 1: Number of Detections

The total number of bounding box detection after nms is 429. As the threshold increases, we can see the number of positive detection decreases. I chose threshold as 0.6906 and achieve the detection result below.



Figure 2: Detection of the car class

2 Object detection on Pascal VOC 2007 dataset

Use the same model to do object detection on testing dataset of Pascal VOC 2007. There are 20 classes in the dataset. Use the same threshold as you choose in the first part. For each detection in a image, we compare it with ground truth annotations of the images. Show one example that contains true positive detections of multi-classes. To quantitatively evaluate the detection results, plot the precision-recall curve for car class. Report the average precision of every category and calculate the mean average precision (MAP) over the 20 classes.

By applying the network onto the testing dataset of Pascal VOC 2007, the following table of AP of different classes can be achieved.

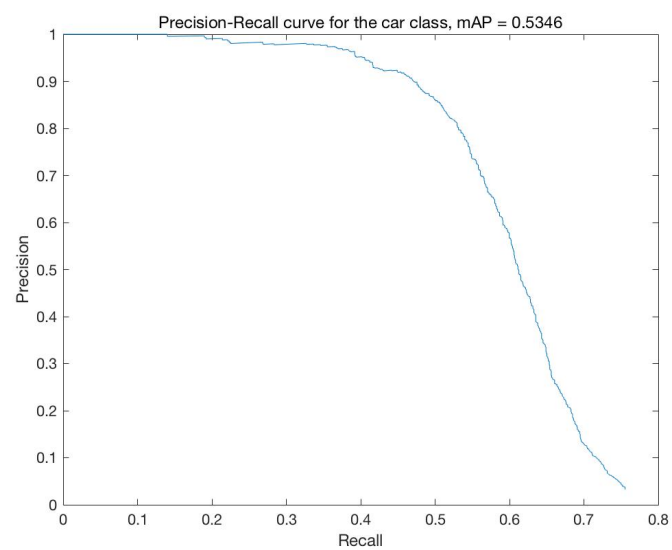


Figure 3: Precision-Recall curve for the car class

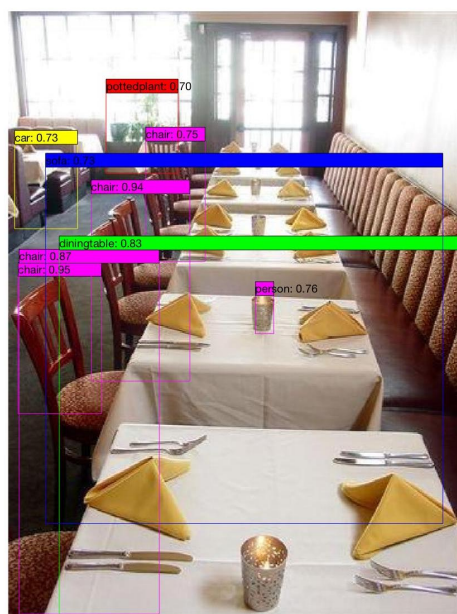


Figure 4: Image with Multiple True Positive Detection

Class	AP
aeroplane	0.610109
bicycle	0.623567
bird	0.418176
boat	0.311831
bottle	0.348172
bus	0.613599
car	0.597605
cat	0.686555
chair	0.620031
cow	0.520160
diningtable	0.496266
dog	0.589480
horse	0.649905
motorbike	0.632312
person	0.513134
pottedplant	0.509296
sheep	0.427564
sofa	0.545914
train	0.655892
tvmonitor	0.522837

In Figure 4, positive detection is made by the model and the threshold applied here is from the first part. 7 positive detections are detected, however there are also two false positives. The chairs, the potterplant, the dining table and the sofa are true positive. Two false positives that one car and one person are detected.