Deep Learning – Lab 04

# 7. Explanation for the 17834 Boxes

The shape (17834,) for the boxes is derived from the grid structure of the YOLO object detection model. YOLO divides the input image into a grid of cells. Each cell predicts a certain number of bounding boxes, along with the associated confidence scores and class probabilities. Given the specific configuration of the grid and the number of anchor boxes, the total number of predictions results in 17834 boxes.

The maximum number of boxes depends on the grid size and the number of anchors. For example, a grid size of 13x13 with 5 anchors will result in 845 boxes. The minimum number is determined by the smallest grid size used by the model.

# 8. Explanation of Anchor Boxes

The anchor boxes are predefined bounding boxes with specific widths and heights. They help the model to predict bounding boxes more accurately by serving as reference points. Using anchor boxes allows the model to predict boxes that are more likely to fit the objects in the images, thus improving accuracy.

The sizes of these anchor boxes are typically determined using a clustering algorithm, such as k-means, on the dimensions of the objects in the training dataset. The result is a set of anchor boxes that are well-suited to the common sizes of objects in the dataset.

# 10. Analysis of Two Selected Images

In this section, I have selected two images from the autonomous driving dataset (e.g., 0104.jpg and 0116.jpg). The observations include correctly detected objects, incorrectly detected objects, undetected objects, and incorrect bounding boxes.

Observations for Image 2 (0104.jpg):  
- Correctly detected objects: Truck and traffic light were accurately detected.  
- Incorrectly detected objects: No  
- Undetected objects: Vehicles those are in too far  
- Incorrect bounding boxes: No

Observations for Image 1 (0116.jpg):  
- Correctly detected objects: Cars and traffic light were accurately detected.  
- Incorrectly detected objects: No  
- Undetected objects: Vehicles those are in too far  
- Incorrect bounding boxes: No

# 11. Comparison of Results

After adjusting the max\_boxes parameter to a different value, the number of detected objects increased slightly, improving detection for smaller objects. However, increasing the score\_threshold led to fewer detections, focusing on higher-confidence objects. Adjusting the iou\_threshold had a minor impact on the overlap between bounding boxes, improving the precision slightly.

A street sign on a street

Description automatically generatedA crosswalk on a street

Description automatically generated

A street with a green light

Description automatically generated

