**Lab 04**

Question 07

1. Reason for 1783 Boxes:

The yolo\_filter\_boxes function filters out boxes based on the object confidence score and a threshold (0.5 in your code). After this filtering process, the remaining boxes are considered as possible detections.

The shape (1783, 4) means there are 1783 bounding boxes, each represented by 4 values (x, y, width, height).

1. Maximum and Minimum Number of Boxes:

The maximum number of boxes is determined by the grid size, the number of anchors, and the number of channels in the YOLO output. In this case, the grid size is 19x19, the number of anchors is 5, and each anchor has a bounding box prediction. Therefore, the maximum number is 19 \* 19 \* 5 = 1805.

The minimum number of boxes is 0 if none of the boxes have a confidence score above the threshold.

1. Changing Values:

Changing the mean, stddev, and threshold values will affect the randomness of the confidence scores and, consequently, the number of boxes that pass the filtering criteria

Question 08

1. Advantage of Anchor Boxes:

Anchor boxes help in predicting bounding boxes more effectively in object detection tasks. They allow the model to predict different aspect ratios and scales of objects in a single pass. This increases the accuracy of the model in detecting objects of various sizes and shapes.

1. Method to Determine Anchor Box Sizes:

The sizes of anchor boxes are usually determined using **K-means clustering** on the dataset's ground truth bounding boxes. This method groups similar bounding box dimensions together and finds representative sizes that the network will use as priors during detection.

Question 10

Original Image

A street with a green light

Description automatically generated

Output Image

A street with a green light

Description automatically generated

The bus has been correctly identified and the bounding box is right as well, but the truck, traffic lights and the jeep haven’t been identified. Also there is a car in the right side of the pic that haven’t been identified.

Original image

A road with trees on the side

Description automatically generated

Output image

A road with trees on the side

Description automatically generated

Cars on the left and right sides of the picture haven’t been identified.

Question 11

No changes after changing(increased) the **max\_boxes** value in the yolo\_eval function

After changing(decreased) the **score\_threshold** there was a significant change

**Picture 1**

**A street with traffic lights and trees

Description automatically generated**

Output was significantly increased it has detected the car, truck and traffic lights but the truck was identifies as a bus.

**Picture 2A road with trees and signs

Description automatically generated**

Output has significantly increased it has identified almost all the cars.

* No changes after changing(increased) the **iou\_threshold** value in the yolo\_eval function.
* In the code where detecting the objects in all autonomous driving dataset images in the images directory I had a trouble having detecting a something else other than images in the images directory, it was “.ipynb\_checkpoints”, as I kept the collab and started after a bit it had saved a checkpoint so I edited the code to ignore that. Just for your information. Highlighted below the part I added to the code.

new\_path = 'lab\_5/images'

for file\_name in os.listdir(new\_path):

**if file\_name.startswith('.'):**

**continue**

  # if file\_name[0] == '0': # images from [ 0100.jpg , 0120.jpg ]

  out\_scores, out\_boxes, out\_classes = predict\_(sess, file\_name)