Assignment 3
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Question 1 -
Question1Report.pdf contains the walkthrough over all code.
Question1.pynb is ipython notebook for the solution.

1. Created the dataset with label ”1” as vehicle and “0” as non -vehicle.
2. Splitted the dataset in 80-20.
3. For all training images -
    a. Take a image, split the image in 10 patches.
    b. For each patch compute the HOG descriptor.
    c. Cluster the features of patches.(k = 20).
4. Compute the histogram of the training images.
5. Compute the histogram of the testing images.
6. Normalize the histogram.

Note: If I follow the approach where the patches are not taken, then accuracy comes better. But it was not done as the concept of patches is mentioned in assignment.
Accuracy = 0.4968

Question 2 -

Code Readme -

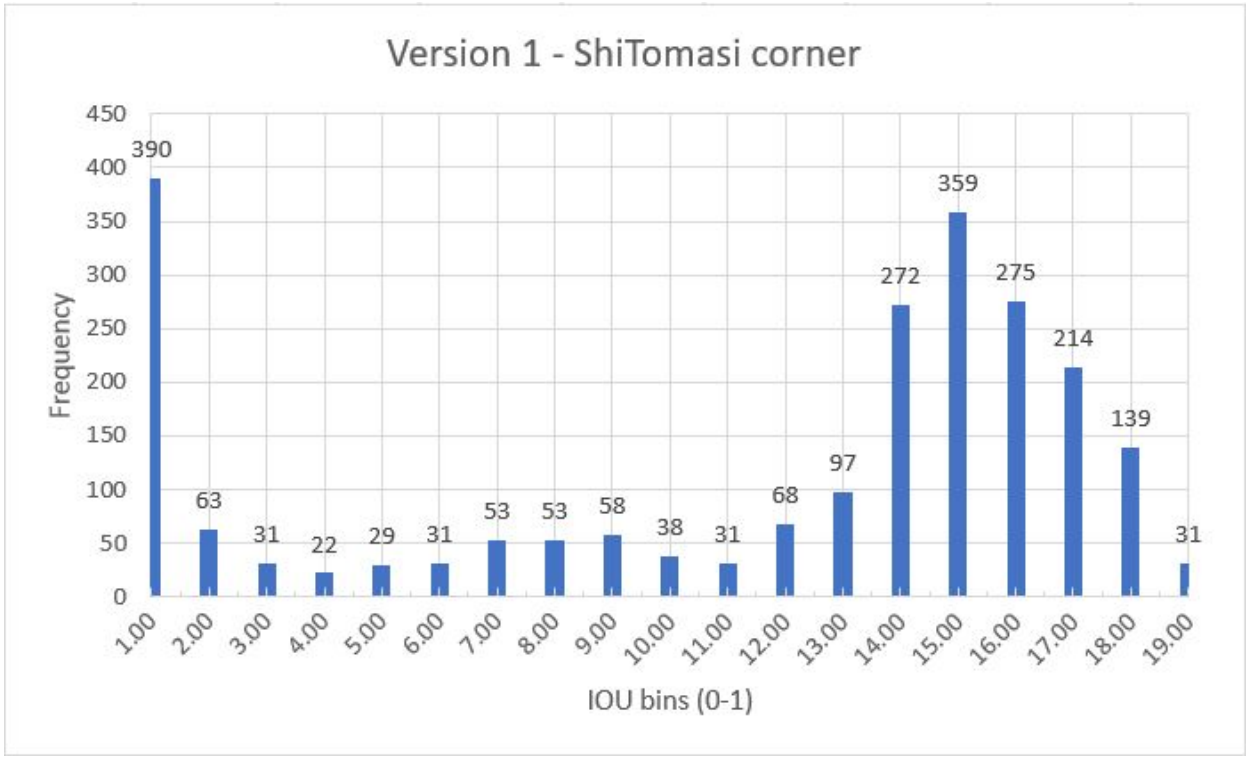
1. IOU computation code is taken from blog.
2. Lucas Kanade is taken from opencv toolbox of python.

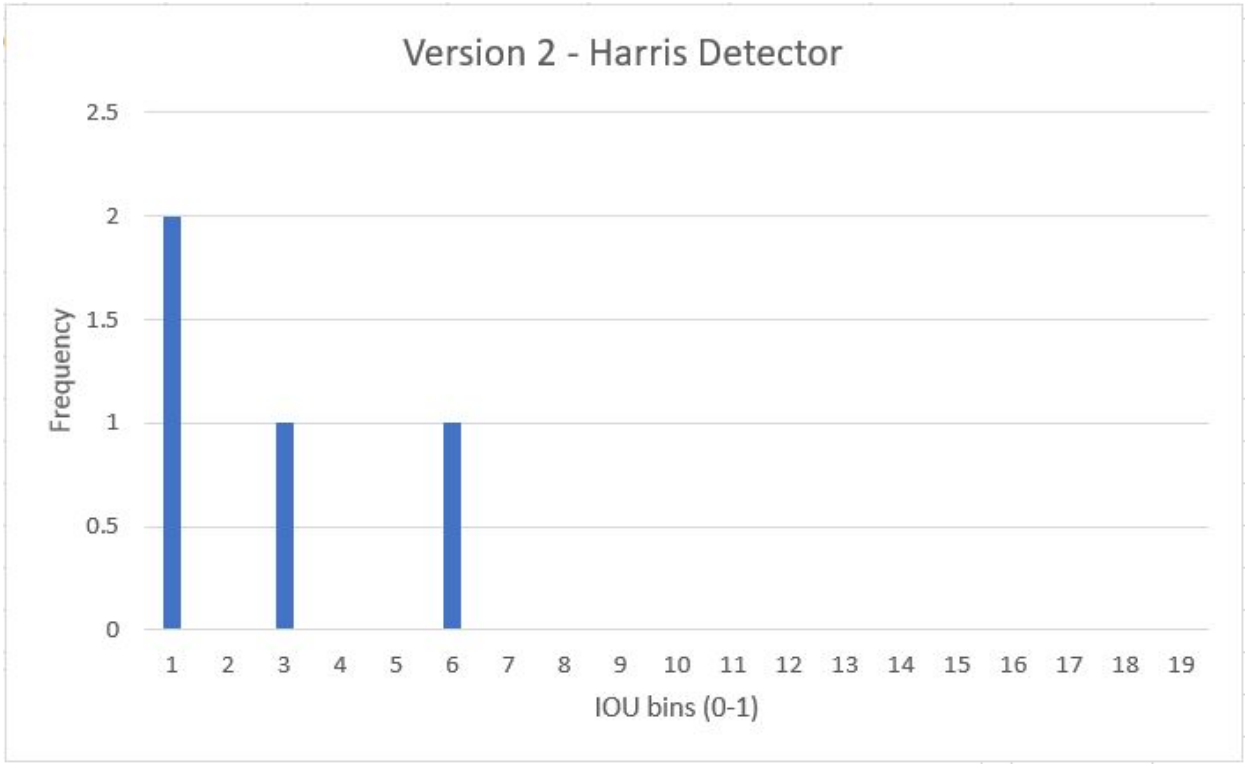
Work Done -

1. Two models are explored.
2. One with Harris detector and one with Shi Tomasi corner detection.

Changes done -
Use of Shi Tomasi corner detection. The Harris Corner Detector is just a mathematical way of determining which windows produce large variations when moved in any direction. With each window, a score R is associated. Based on this score, you can figure out which ones are corners and which ones are not. The Harris corner detector has a corner selection criteria. A score is calculated for each pixel, and if the score is above a certain value, the pixel is marked as a corner. The score is calculated using two eigenvalues. That is, you gave the two eigenvalues to a function. The function manipulates them, and gave back a score. Shi and Tomasi suggested that the function should be done away with. Only the eigenvalues should be used to check if the pixel was a corner or not.

Graphs -


Version 1 - ShiTomasi corner
Frequency
450
400
350
300
250
200
150
100
50
0
390
63
31
22
29
31
53
53
58
38
31
68
97
272
359
275
214
139
31
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
10.00
11.00
12.00
13.00
14.00
15.00
16.00
17.00
18.00
19.00
IOU bins (0-1)


Version 2 - Harris Detector
Frequency
2.5
2
1.5
1
0.5
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
IOU bins (0-1)