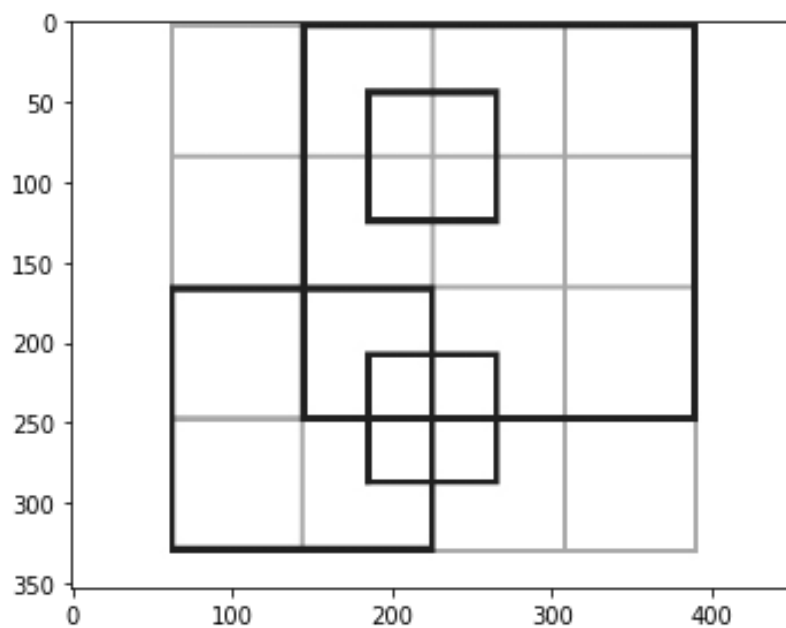


Q.1 Harris Corner Detector

Aim: To find the interest points(Corner points) in the given image using Harris Corner Detector.

Output:

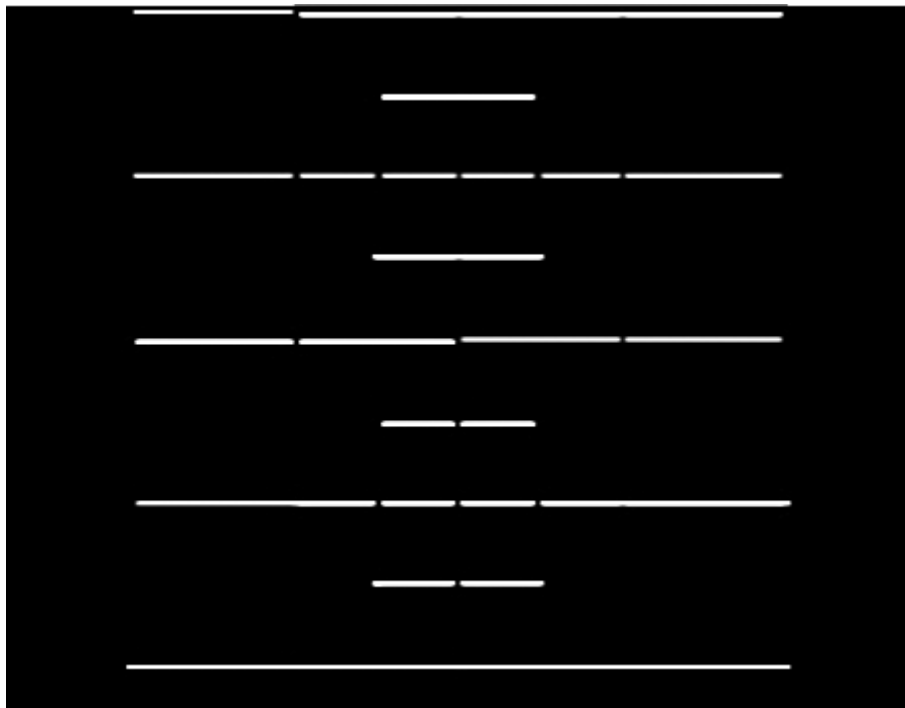
Given input image



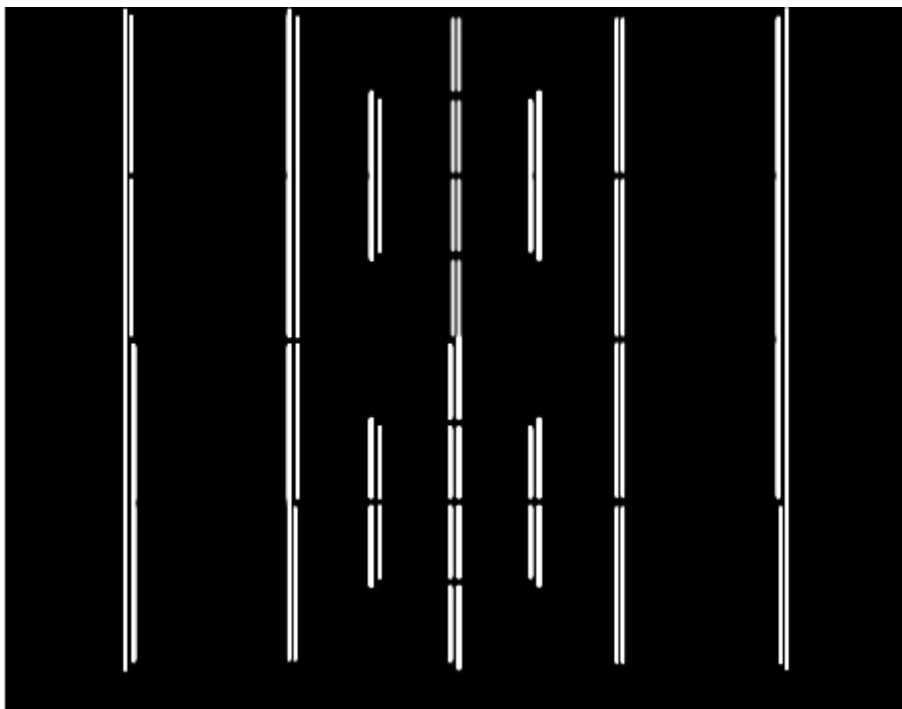
X gradient(vertical edges)



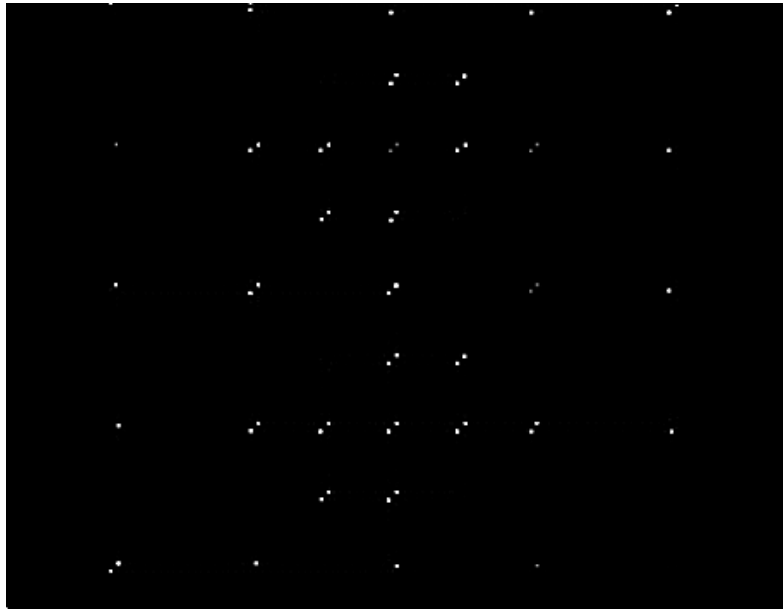
Y gradient(horizontal edges)



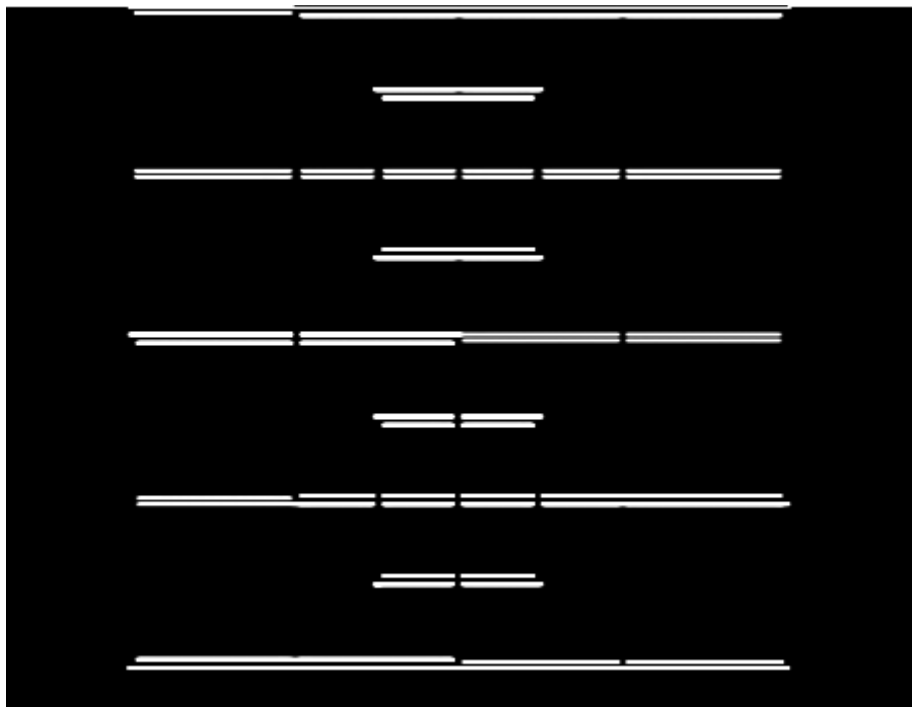
lx2



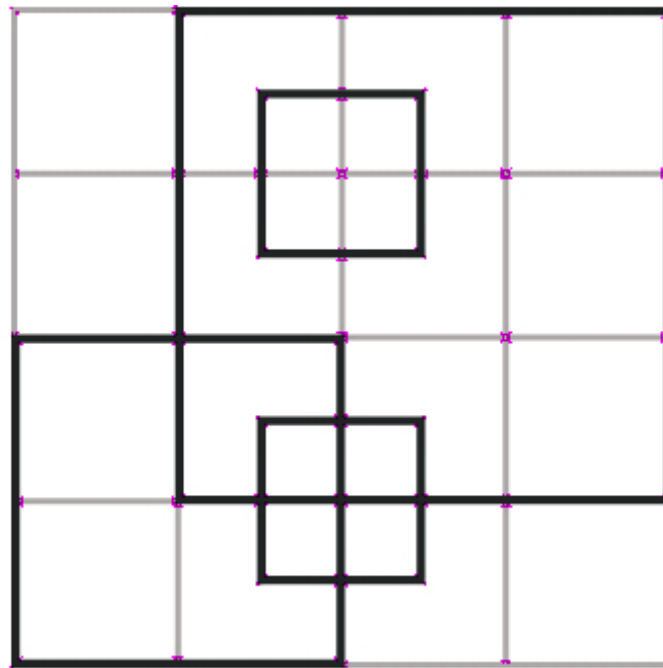
lxy



ly2



Corner Points highlighted with different colour



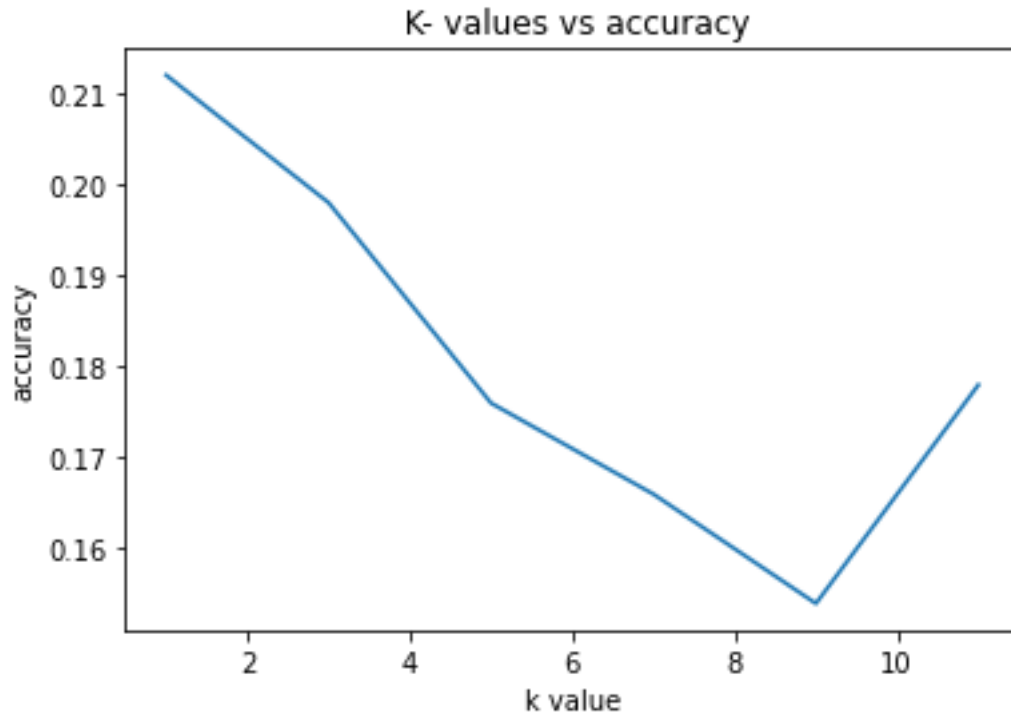
Inferences:

- 1) The threshold is a hyperparameter on changing its value the points which can be consider as corner points changes
- 2) Using Sobel kernel $_x$ we can find the gradients in x direction. And using Sobel kernel $_y$ we can find the gradients in y direction
- 3) let λ_1 and λ_2 are the eigenvalues of M, then
 - a) When $|R|$ is small, which happens when λ_1 and λ_2 are small, the region is flat.
 - b) When $R < 0$, which happens when $\lambda_1 \gg \lambda_2$ or vice versa, the region is an edge.
 - c) When R is large, which happens when λ_1 and λ_2 are large and $\lambda_1 \sim \lambda_2$, the region is a corner.
- 4) After getting the corner points we highlight those points in the given image using purple colour.

Q.2 K-NN Classification:

Aim: Compute KNN for different values of K and observe the variation of accuracy with K.

Output:



Inferences:

1. The accuracy for K=1 is 21.2% and for k=3 is 19.8 , for K=5 is 17.6%, for K=7 is 16.6%, for K=9 is 15.4%. for K=11 is 17.8% .
2. The value of k first decreases till the value 9 then it increase at k= 11.
3. The dimensionality is large due to which distances might be close to each other because of the curse of dimensionality dur to which the accuracy are nearer to each other.

Q.3 Compute a Histogram of Oriented Gradients (HOG)

Aim: Compute HOG for the image and verify results using inbuilt function 'extract HOG Features' command.

Output:

Given image



Image convert to gray scale



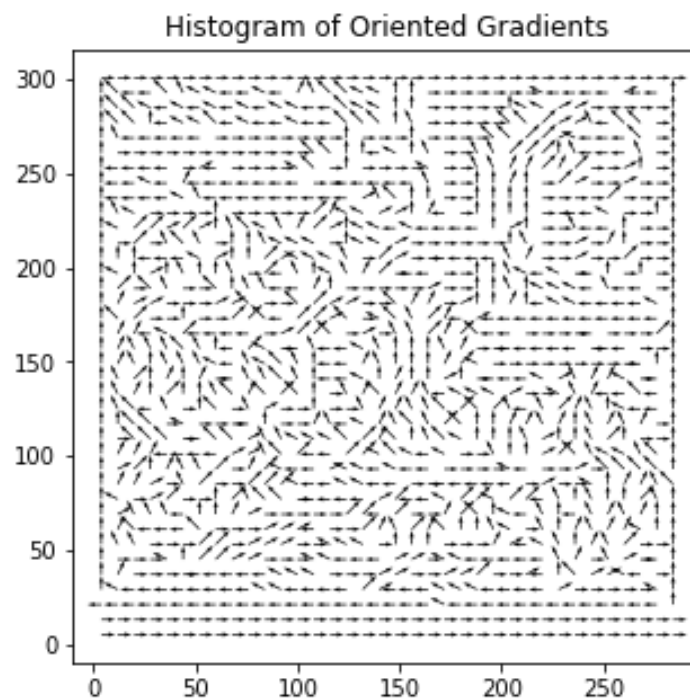
Gradient in X direction



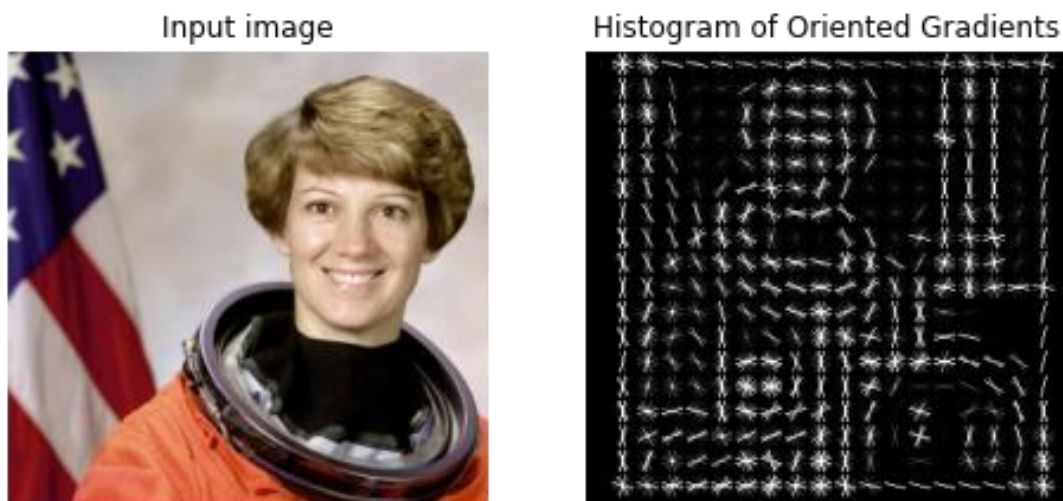
Gradient in Y direction



With out Using inbuilt command



Using inbuilt command HOG



Inferences:

- 1) For a given image find the grayscale image and apply the horizontal and vertical gradients on the image.
- 2) By using horizontal and vertical image find the magnitude of gradients and angle of gradients.
- 3) Then finding the lead direction by taking the 8×8 moving grid by considering the magnitude of gradients.
- 4) By using the Quiver command, we plot the direction at the middle of the 8×8 cell.