Assignment - 1 Report

Code and Results of Canny Edge Detector are in the **CannyEdgeDetector** folder.
Code and Results of Harris Corner Detector are in the **HarrisCornerDetector** folder.

CannyEdgeDetector folder has the following folders :

- **Inputs** : contains 10 input images
- **Outputs** : contains output images with different parameters
    - **g3s3m8m35** : 3x3 Gaussian kernel, 3x3 sobel kernel, minimum threshold = 8, maximum threshold = 35
    - **g5s7m15m65** : 5x5 Gaussian kernel, 7x7 sobel kernel, minimum threshold = 15, maximum threshold = 65
    - **g7s5m50m100** : 7x7 Gaussian kernel, 5x5 sobel kernel, minimum threshold = 50, maximum threshold = 100

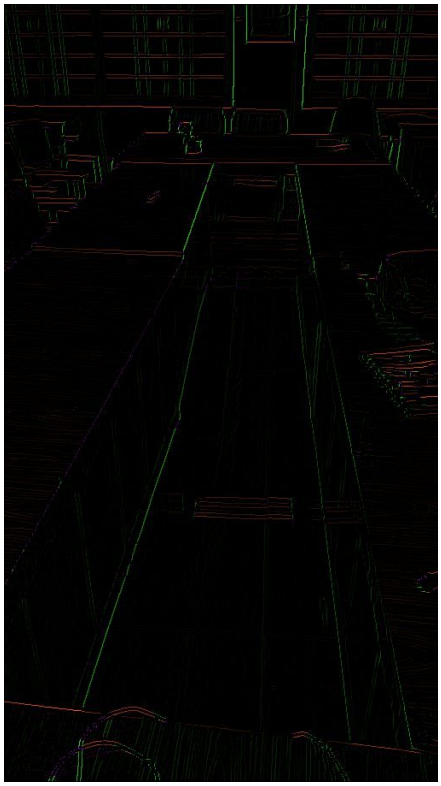
HarrisCornerDetector folder has the following folders :

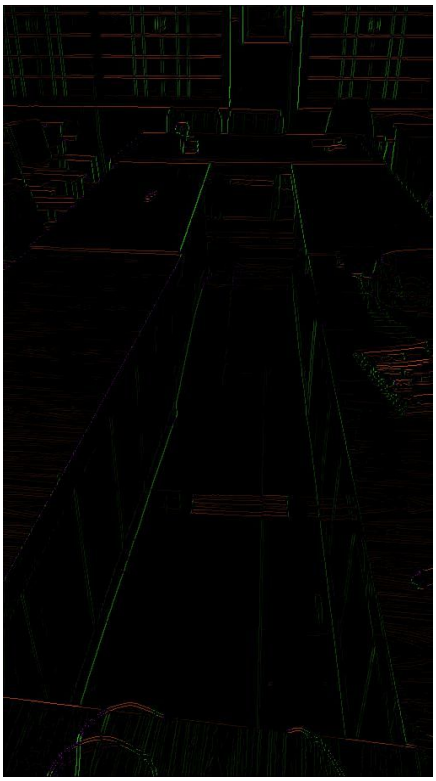
- **Inputs** : contains 10 input images
- **Outputs** : contains output images with different parameters
    - **k0.04tf0.005w3** : Harris Corner Detector Free Parameter k = 0.04, thresholding fraction = 0.005, 3x3 gaussian kernel
    - **k0.06tf0.002w5** : Harris Corner Detector Free Parameter k = 0.06, thresholding fraction = 0.002, 5x5 gaussian kernel

The edge and corner detection of each image with different parameters are compared below and conclusions are drawn.

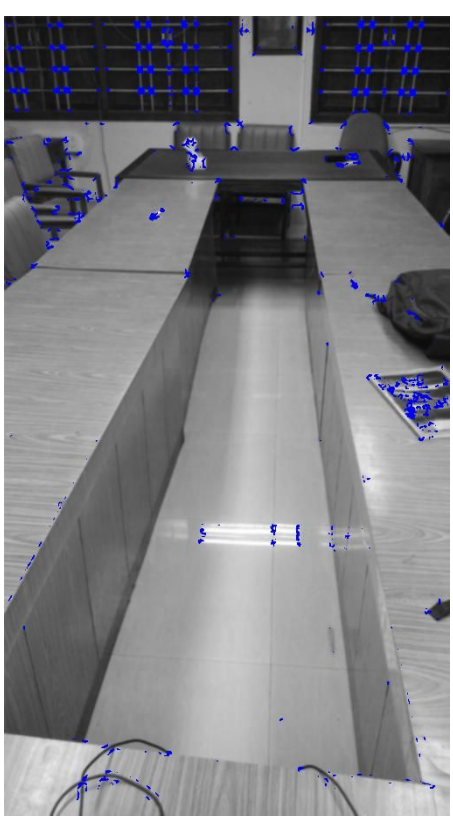
Image 1

5x5 gaussian kernel, 7x7 sobel operator, min threshold = 15, max threshold = 65 vs
3x3 gaussian kernel, 3x3 sobel operator, min threshold = 8, max threshold = 35





5x5 gaussian kernel, Harris Corner Detector free parameter = 0.06, thresholding factor = 0.002 vs **3x3 gaussian kernel, Harris Corner Detector free parameter = 0.04, thresholding factor = 0.005**



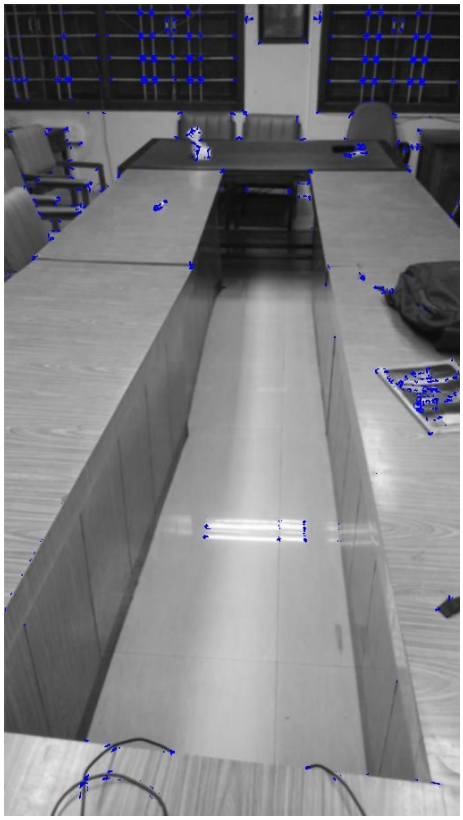
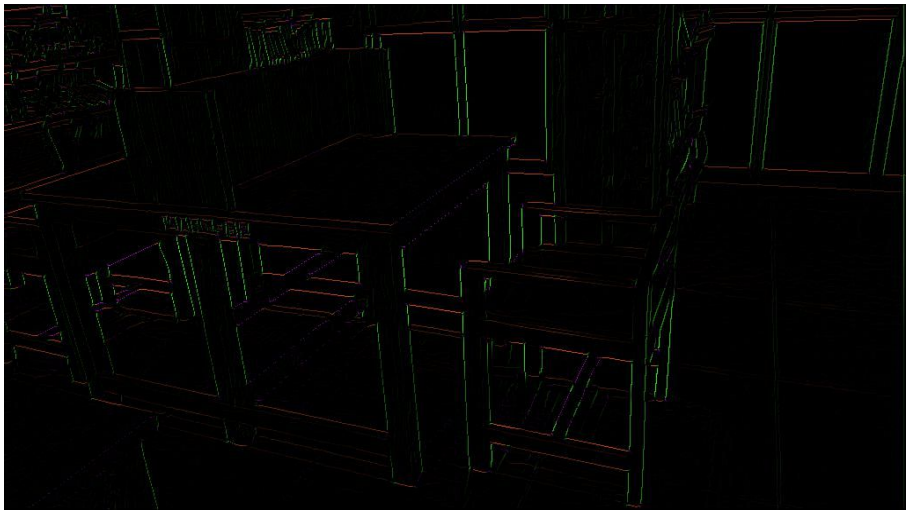
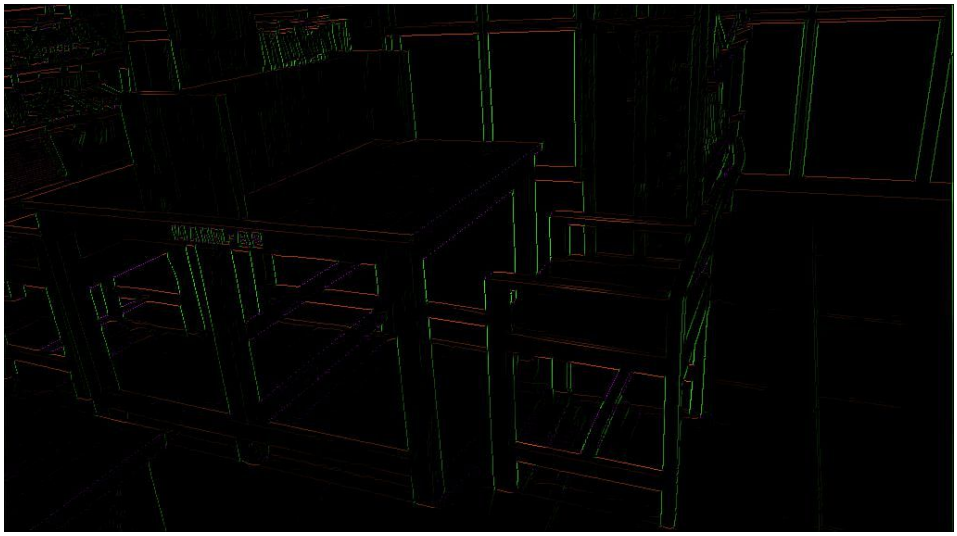


Image 2

5x5 gaussian kernel, 7x7 sobel operator, min threshold = 15, max threshold = 65



3x3 gaussian kernel, 3x3 sobel operator, min threshold = 8, max threshold = 35

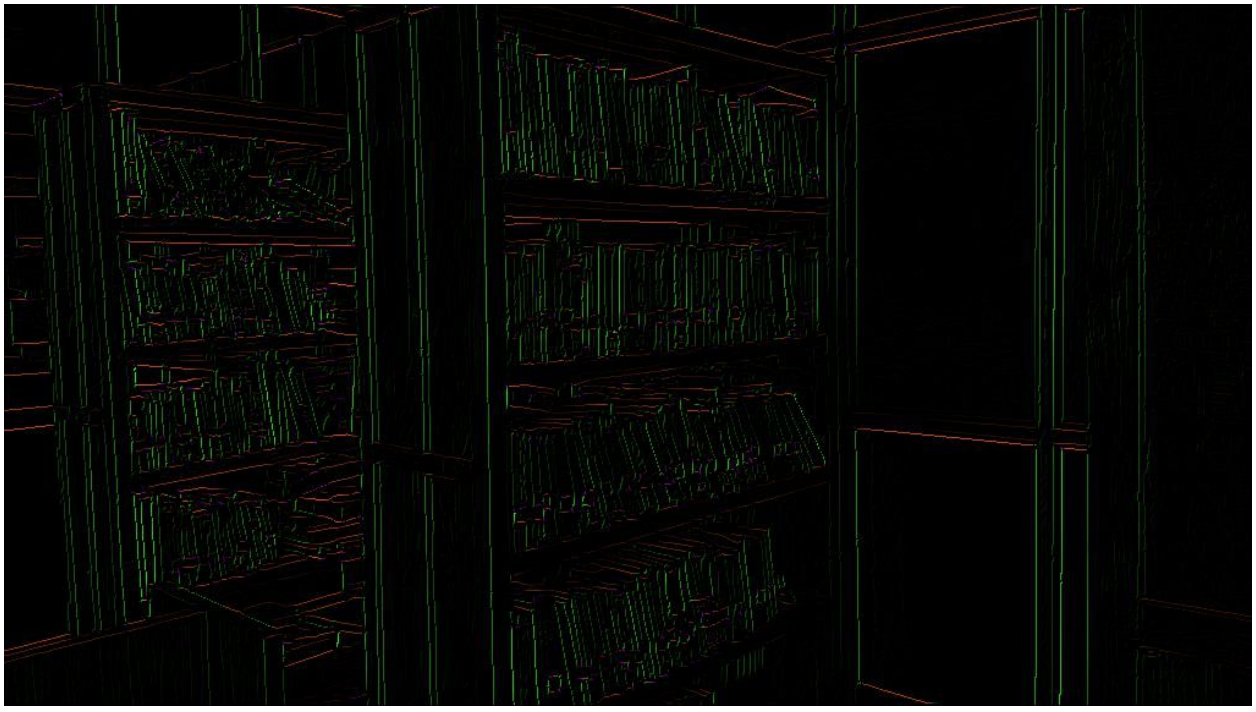


5x5 gaussian kernel, Harris Corner Detector free parameter = 0.06, thresholding factor = 0.002

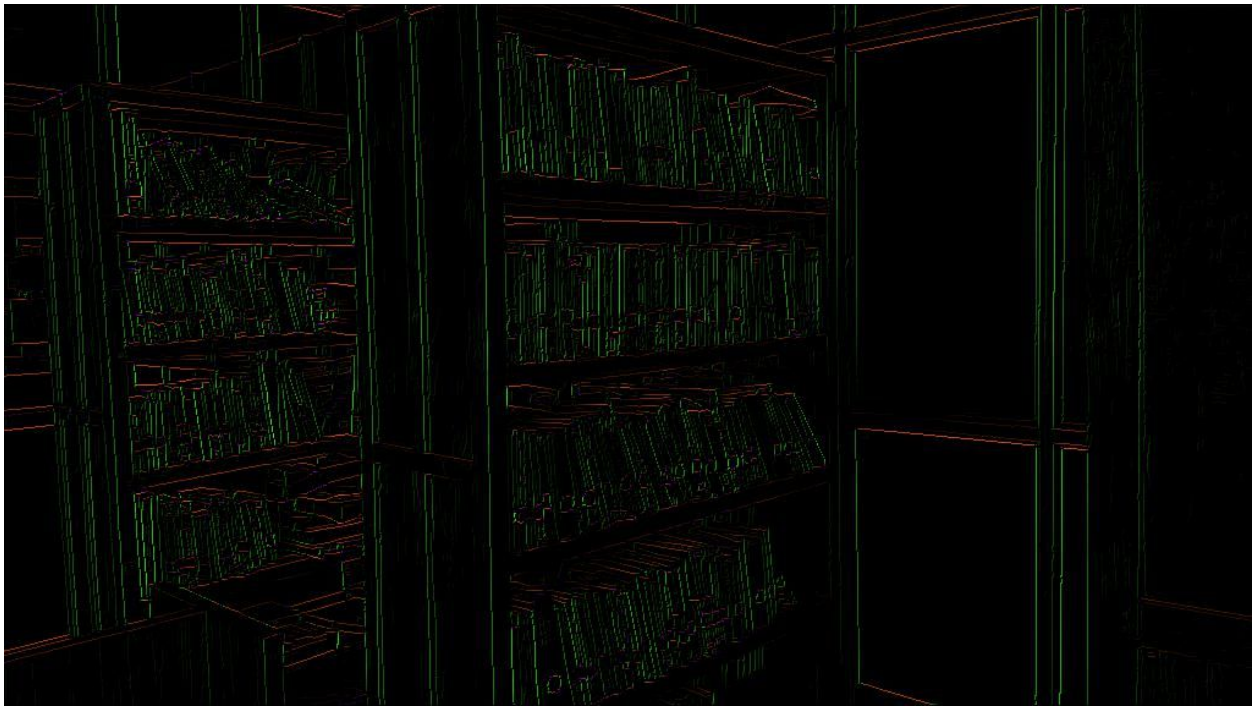
3x3 gaussian kernel, Harris Corner Detector free parameter = 0.04, thresholding factor = 0.005

Image 3

5x5 gaussian kernel, 7x7 sobel operator, min threshold = 15, max threshold = 65



3x3 gaussian kernel, 3x3 sobel operator, min threshold = 8, max threshold = 35

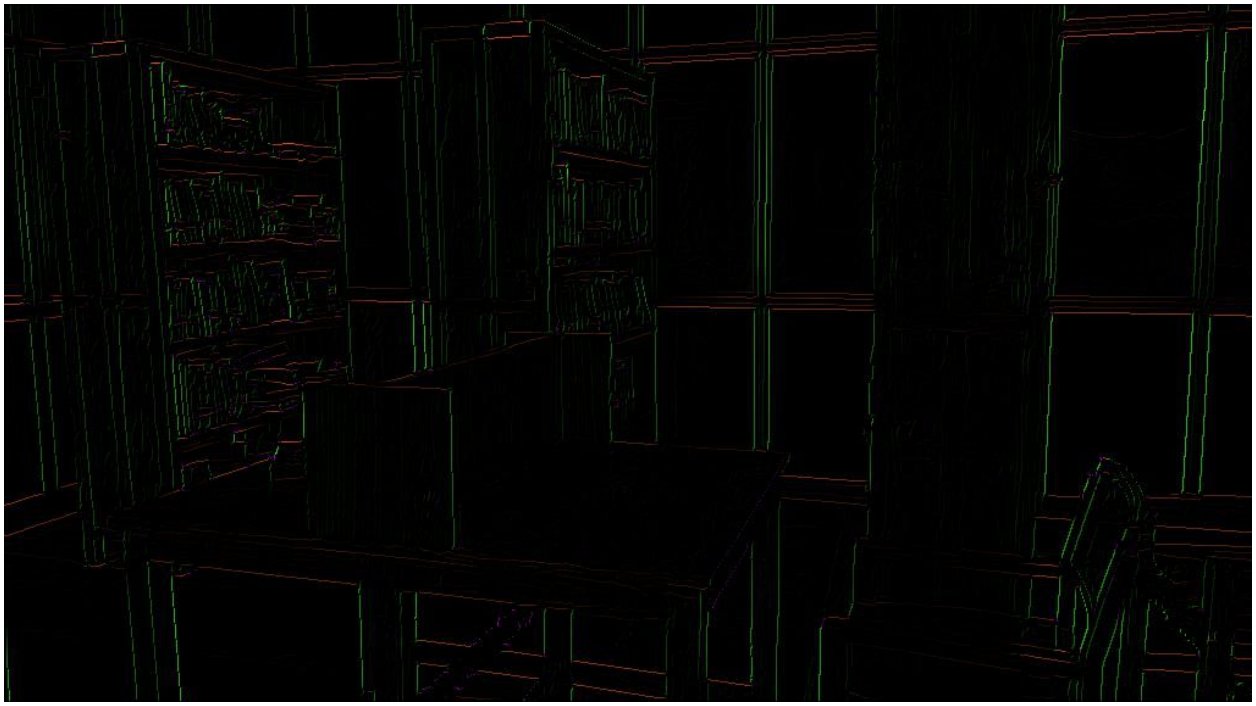


5x5 gaussian kernel, Harris Corner Detector free parameter = 0.06, thresholding factor = 0.002

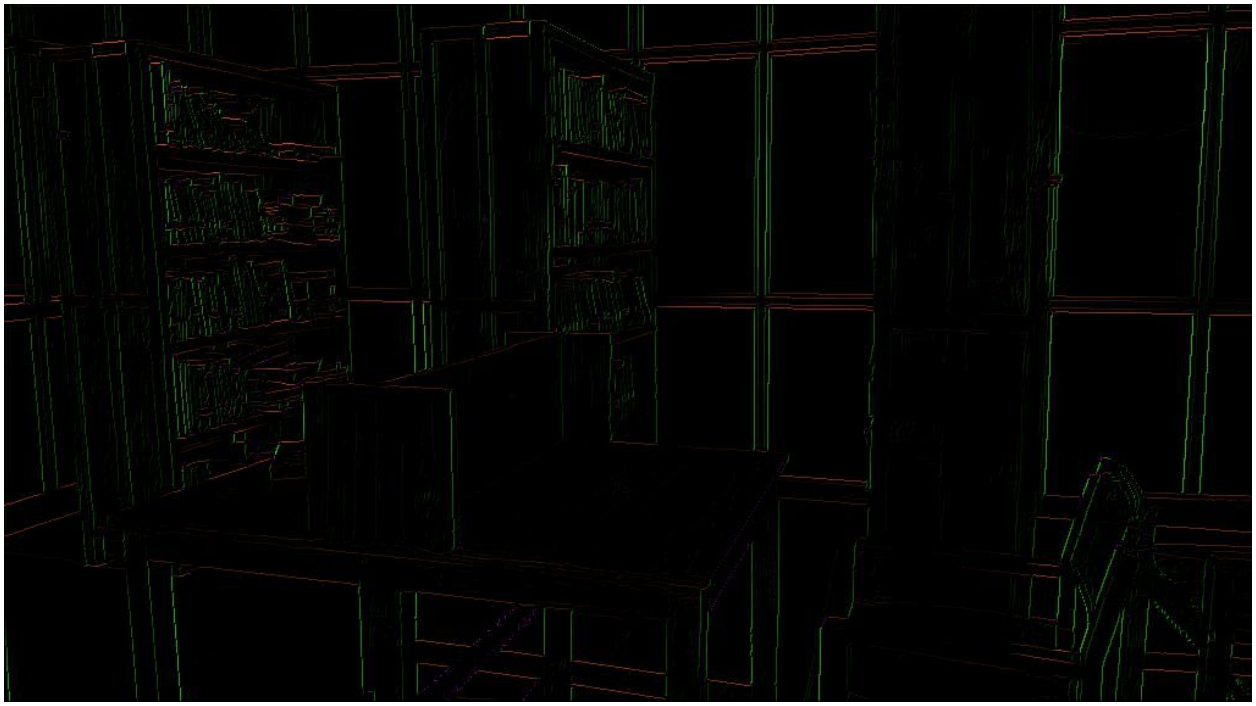
3x3 gaussian kernel, Harris Corner Detector free parameter = 0.04, thresholding factor = 0.005

Image 4

5x5 gaussian kernel, 7x7 sobel operator, min threshold = 15, max threshold = 65



3x3 gaussian kernel, 3x3 sobel operator, min threshold = 8, max threshold = 35

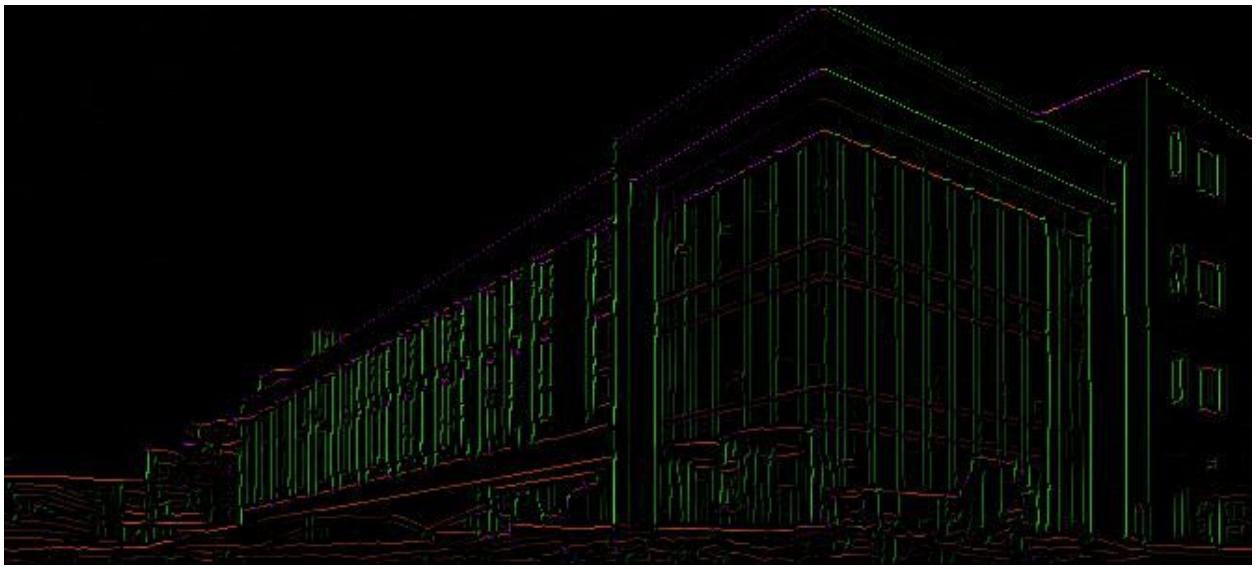


5x5 gaussian kernel, Harris Corner Detector free parameter = 0.06, thresholding factor = 0.002

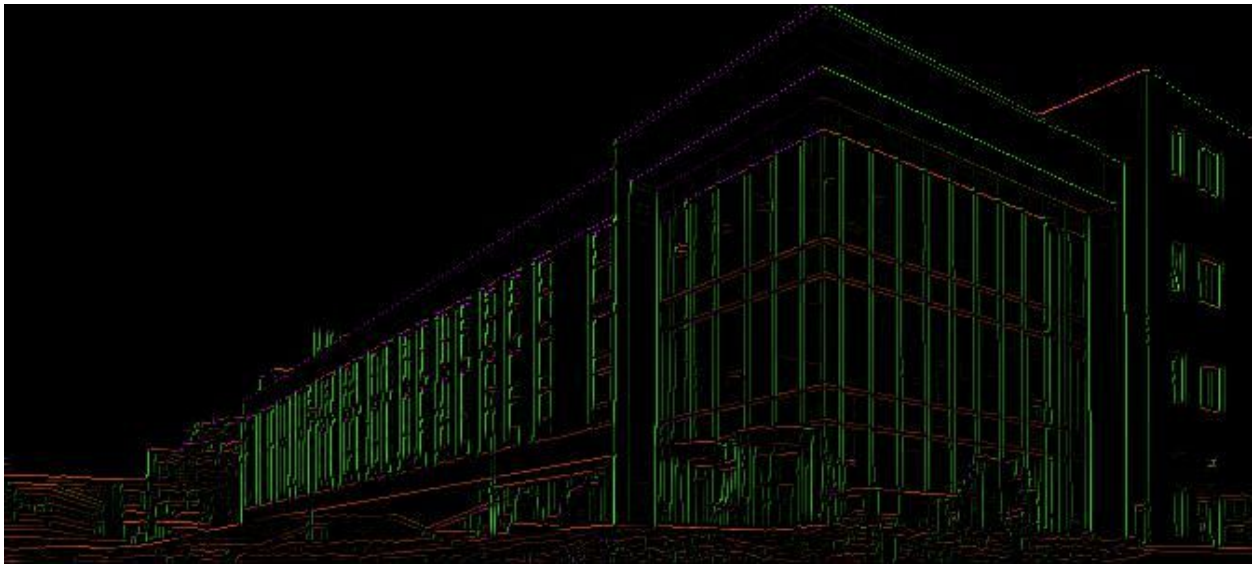
3x3 gaussian kernel, Harris Corner Detector free parameter = 0.04, thresholding factor = 0.005

Image 5

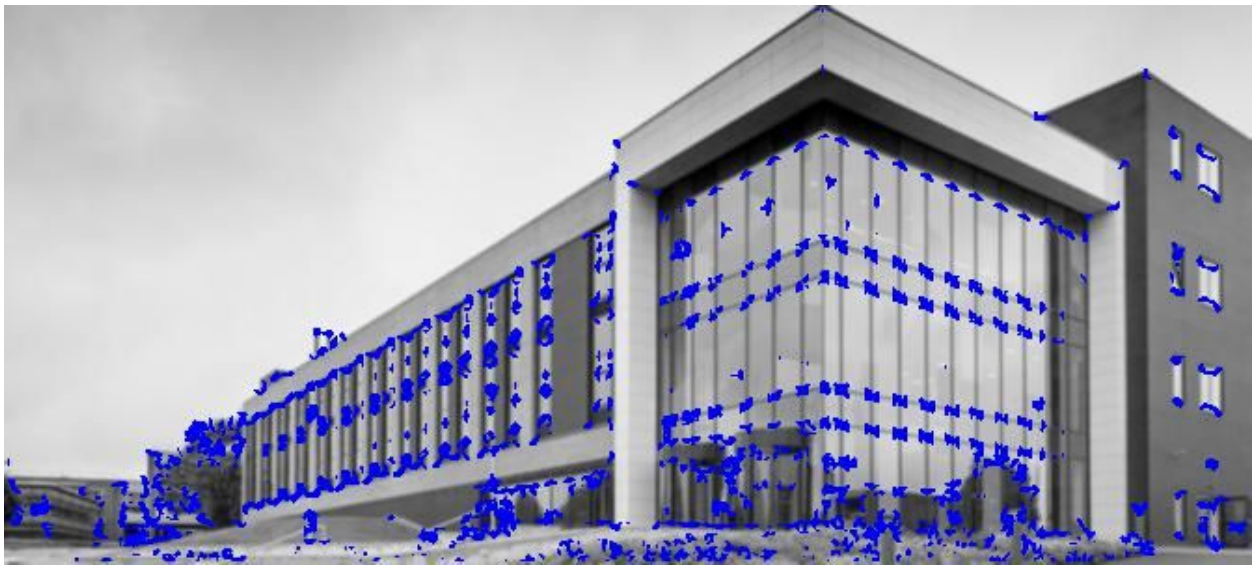
5x5 gaussian kernel, 7x7 sobel operator, min threshold = 15, max threshold = 65



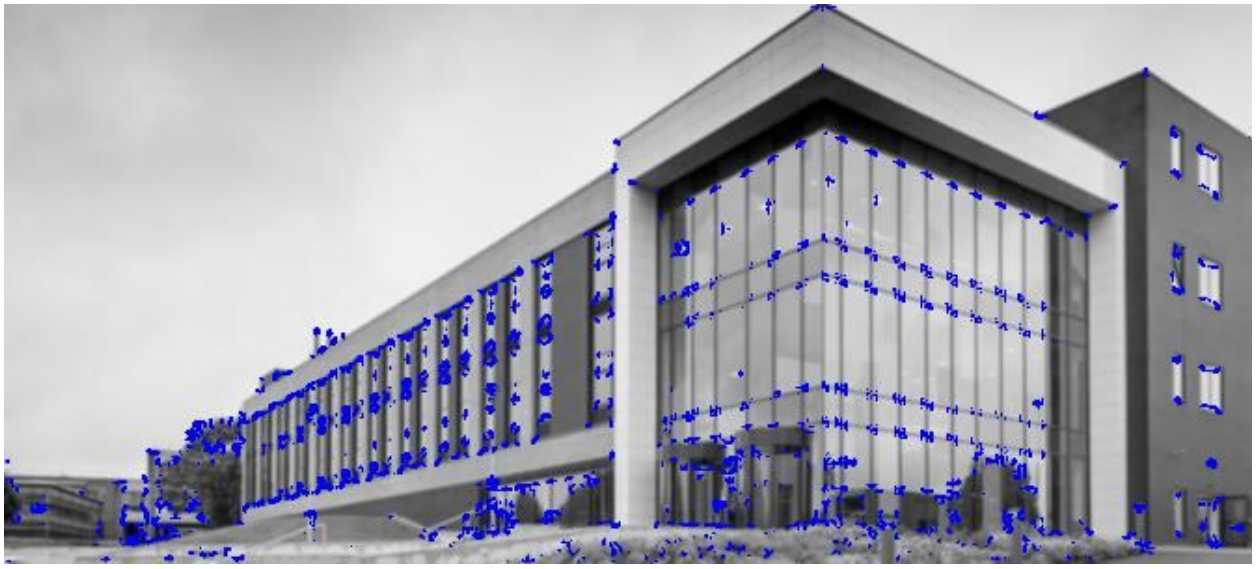
3x3 gaussian kernel, 3x3 sobel operator, min threshold = 8, max threshold = 35



5x5 gaussian kernel, Harris Corner Detector free parameter = 0.06, thresholding factor = 0.002



3x3 gaussian kernel, Harris Corner Detector free parameter = 0.04, thresholding factor = 0.005



On the basis of these comparisons, we can observe the following results :

1. The larger the size of gaussian kernel, the lower the detector's sensitivity to noise. The localization error to detect the edge will slightly increase with the increase of the Gaussian filter kernel size. 5x5 is a good size for most cases.
2. As the Sobel kernel size increases, the edges get more blurry because more pixels are a part of the convolution process.
3. As the minimum and maximum threshold decrease, more no.of edges are detected.
4. As the thresholding factor decreases, the corner detection gains more accuracy and precision.
5. As the Harris Corner Detector Free Parameter (k) decreases, the value of R increases. And hence, corner detection is better.