

CS484 HOMEWORK 1 REPORT

You can find the codes in the file `cs484_hw1_AI.ipynb` which also include all comments, markdowns and cached results.

Question 1

Results for filter: `filter_q1 = np.array([(1, 1, 1), (1, 1, 1), (1, 1, 1)])`

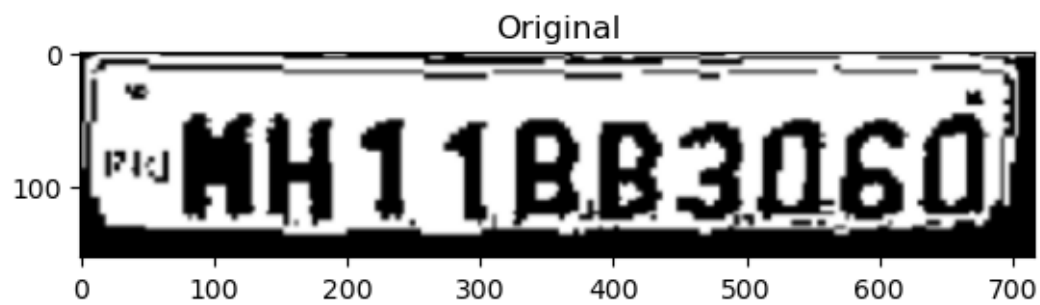


Figure 1: Original Image

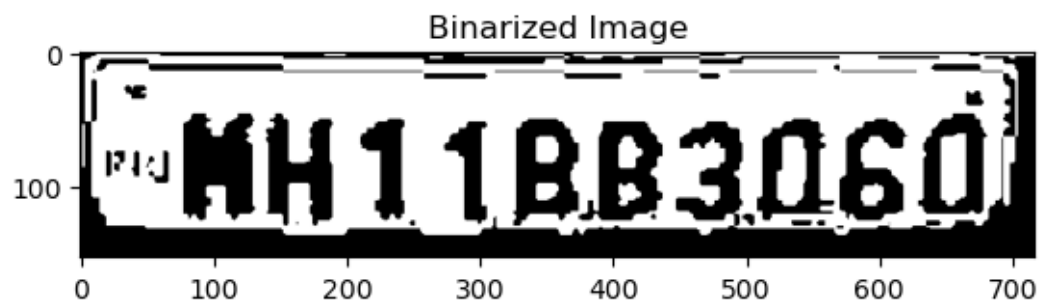


Figure 2: Binarized Image



Figure 3: Dilated Image



Figure 4: Eroded Image

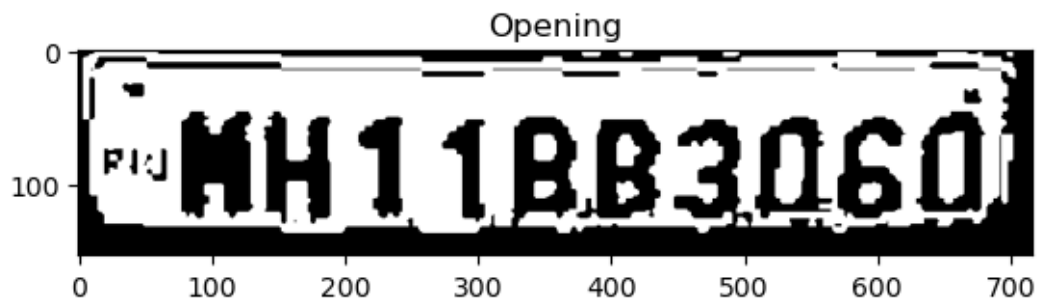


Figure 5: Applying erosion followed by dilation (opening)

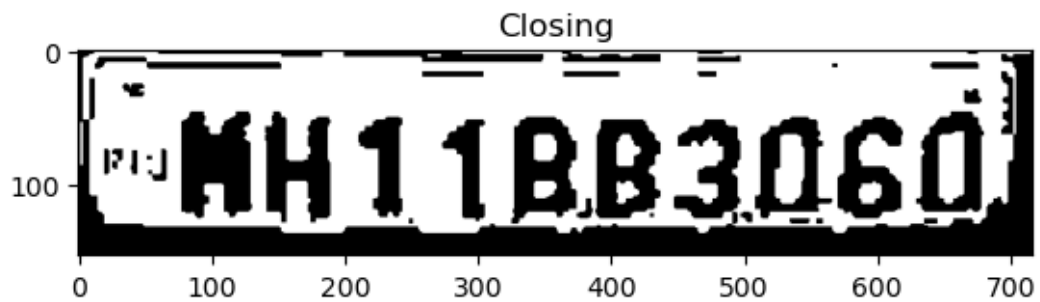


Figure 6: Applying dilation followed by erosion (closing)

Question 2

Results for histogram part:

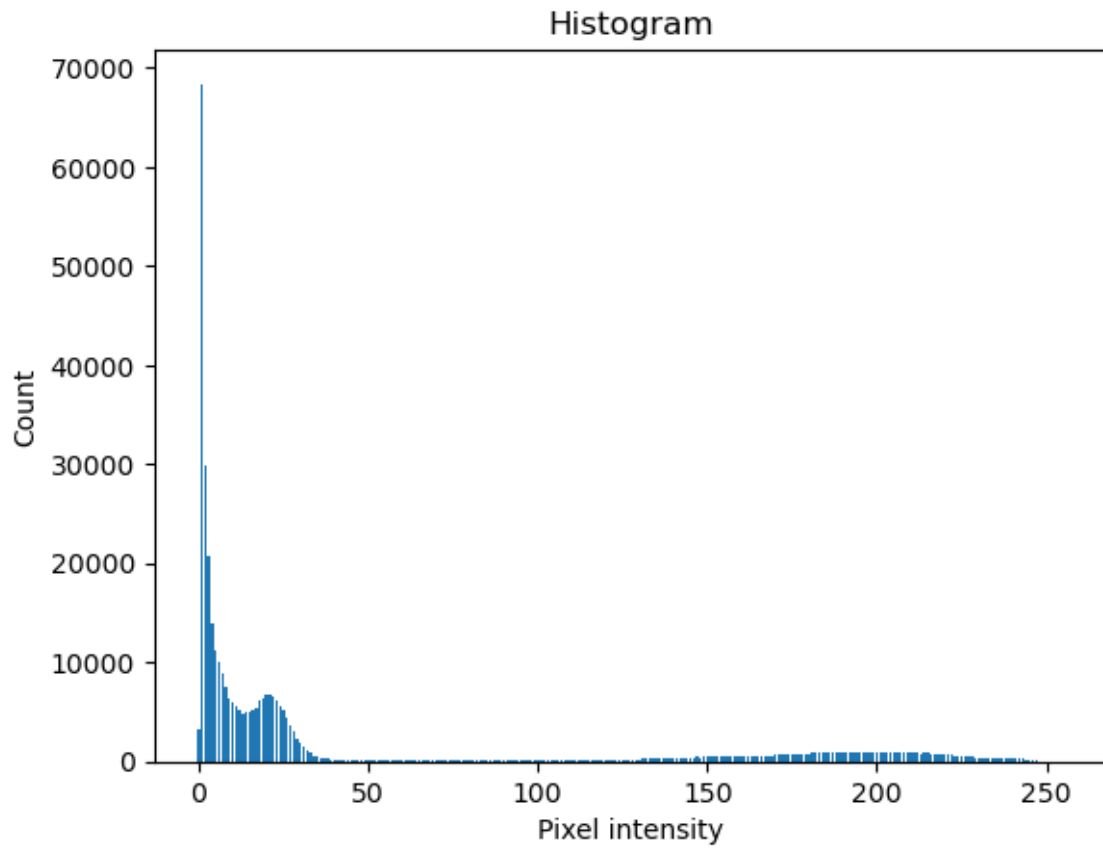


Figure 7: Histogram for Image (Figure2_a)

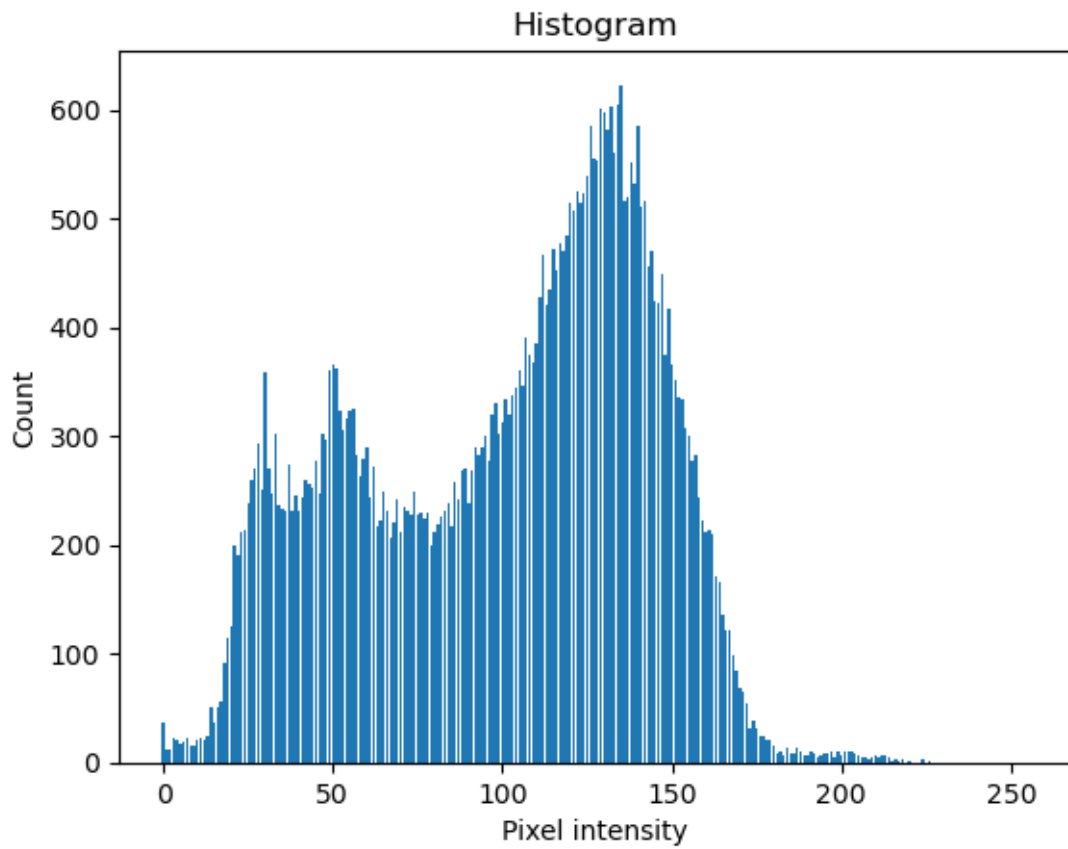


Figure 8: Histogram for Image (Figure2_b in pdf)

Question 3

Results for otsu threshold part:



Figure 9: Original Image (Figure3_a in the report)

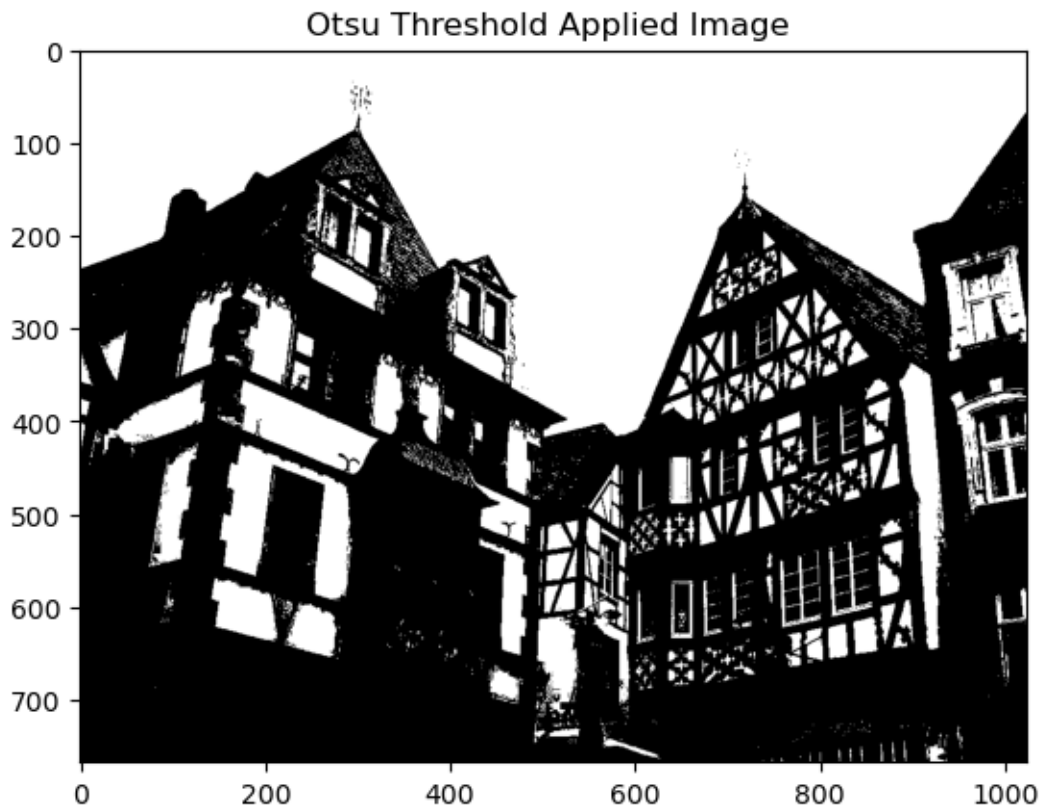


Figure 10: Otsu Threshold Applied Image (Figure3_a in the report)

threshold value is 152

Note: The threshold value for Figure 10 is 152.

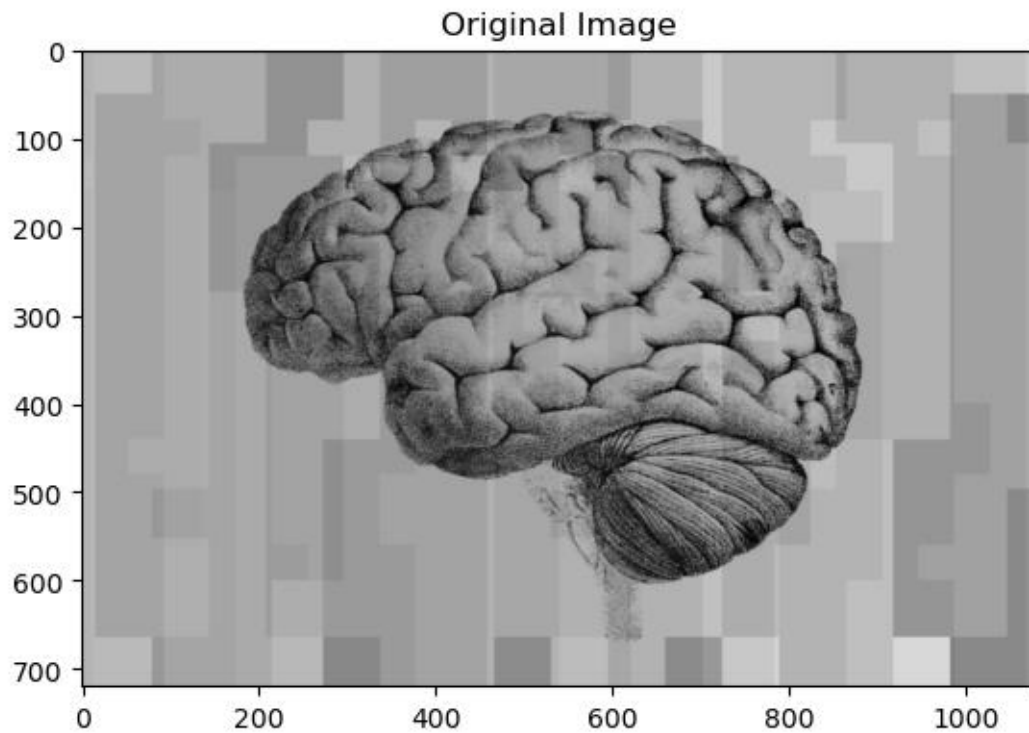


Figure 11: Otsu Threshold Applied Image (Figure3_b in the report)

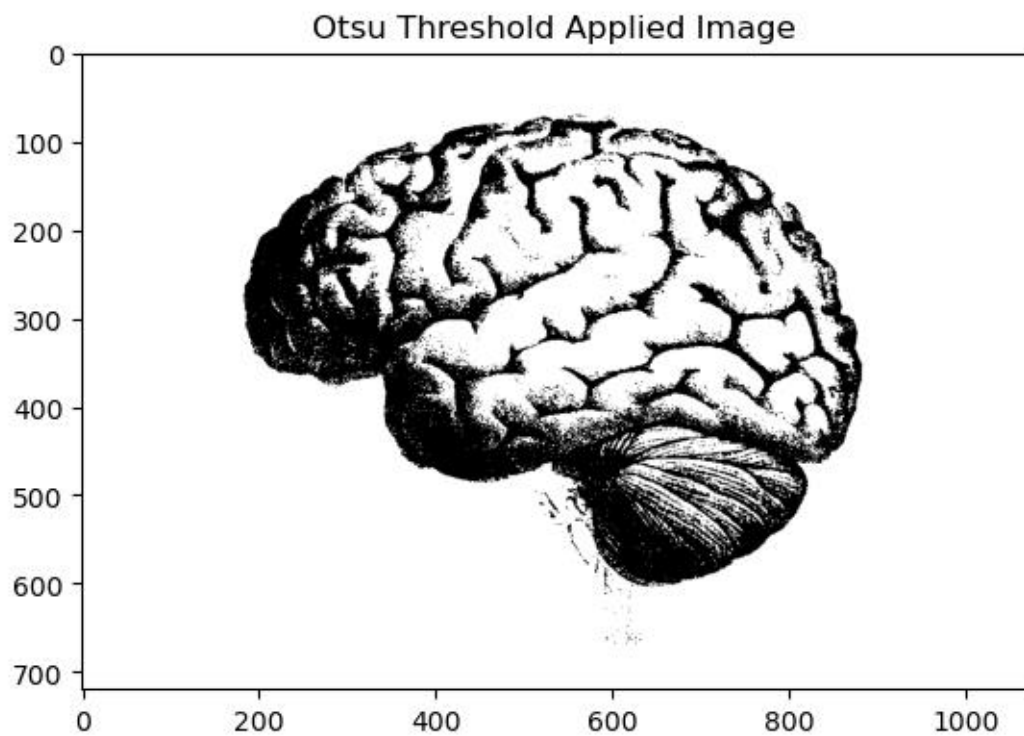


Figure 12: Otsu Threshold Applied Image (Figure3_b in the report)

Note: The threshold value for Figure 12 is 120. `threshold value is 120`

Discussion: No, they are the outcomes are not always perfect. Otsu's thresholding approach assumes that the foreground and background pixels constitute two separate modes in the histogram of pixel intensities. If this assumption is incorrect, the approach may not be effective in distinguishing the foreground from the background. Also, the approach may be susceptible to noise or fluctuations in light, which might lead to mistakes in segmentation findings.

As a result, while Otsu's thresholding approach is a strong tool for picture segmentation, it is not flawless, and its efficacy is dependent on the unique properties of the image being studied. Also, it is worth to mention that even though the my results are very similar to built-in function results, built-in ones better optimized for this purpose and may impact on the result.

Question 4

Results for 2d convolution part:

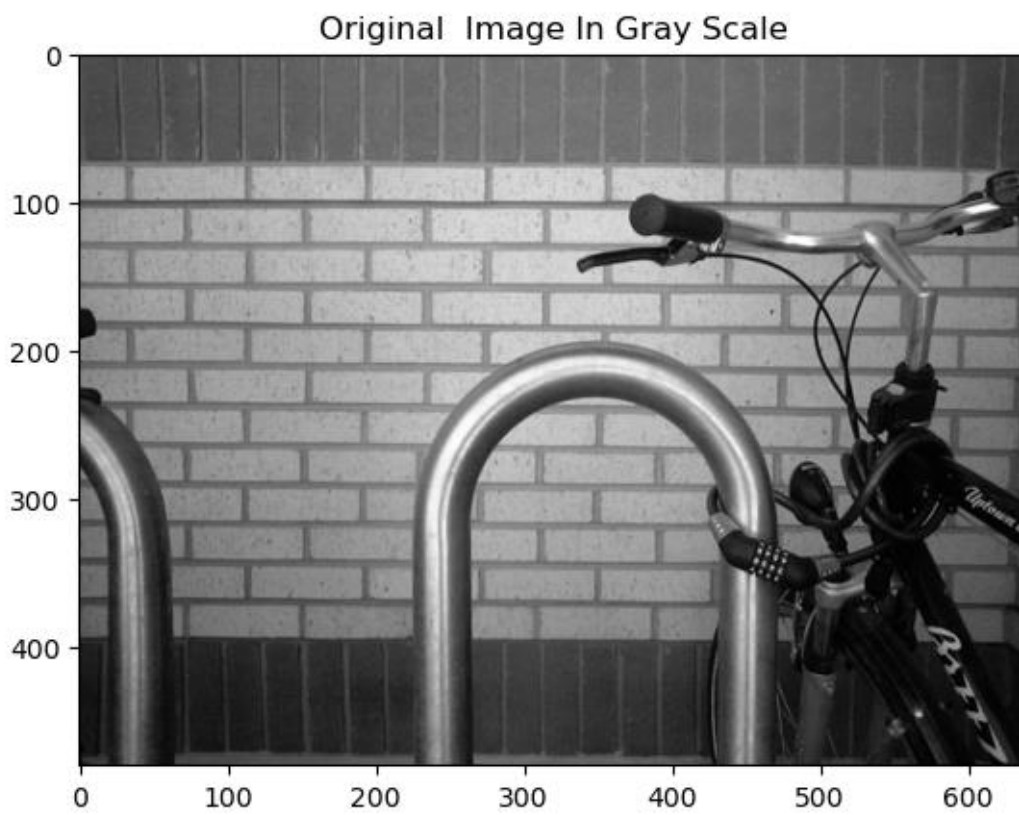


Figure 13: Original Image in Gray Scale (Figure4 in pdf)

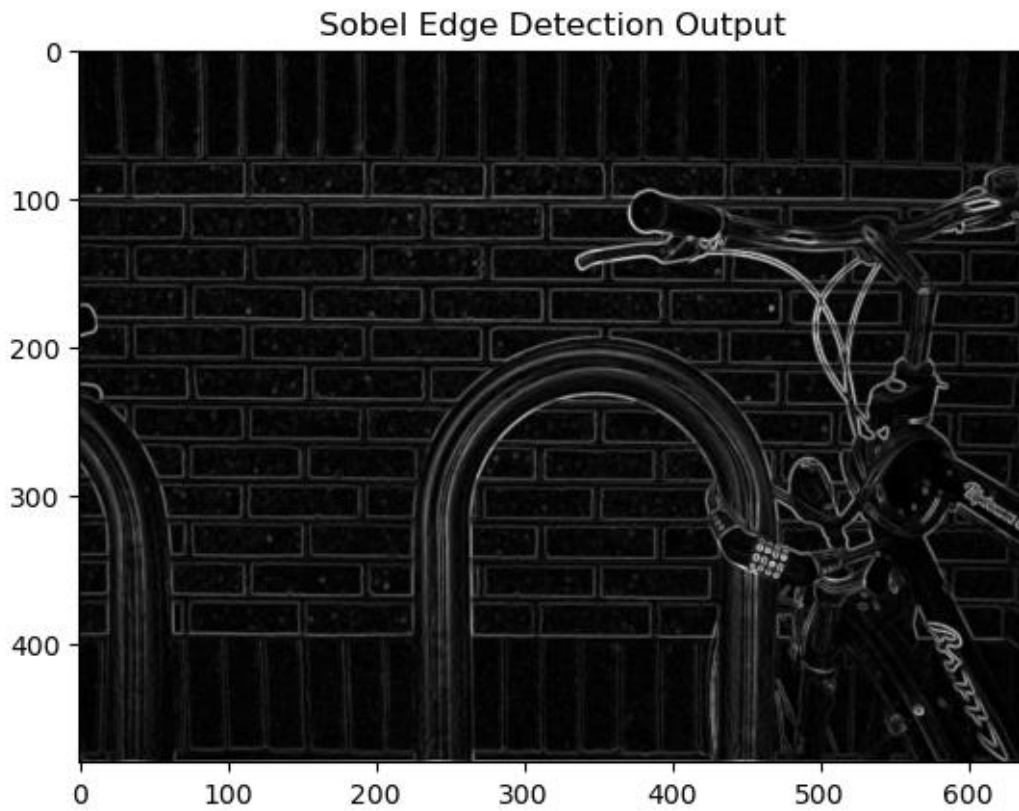


Figure 14: Sobel edge detection applied gray scale image

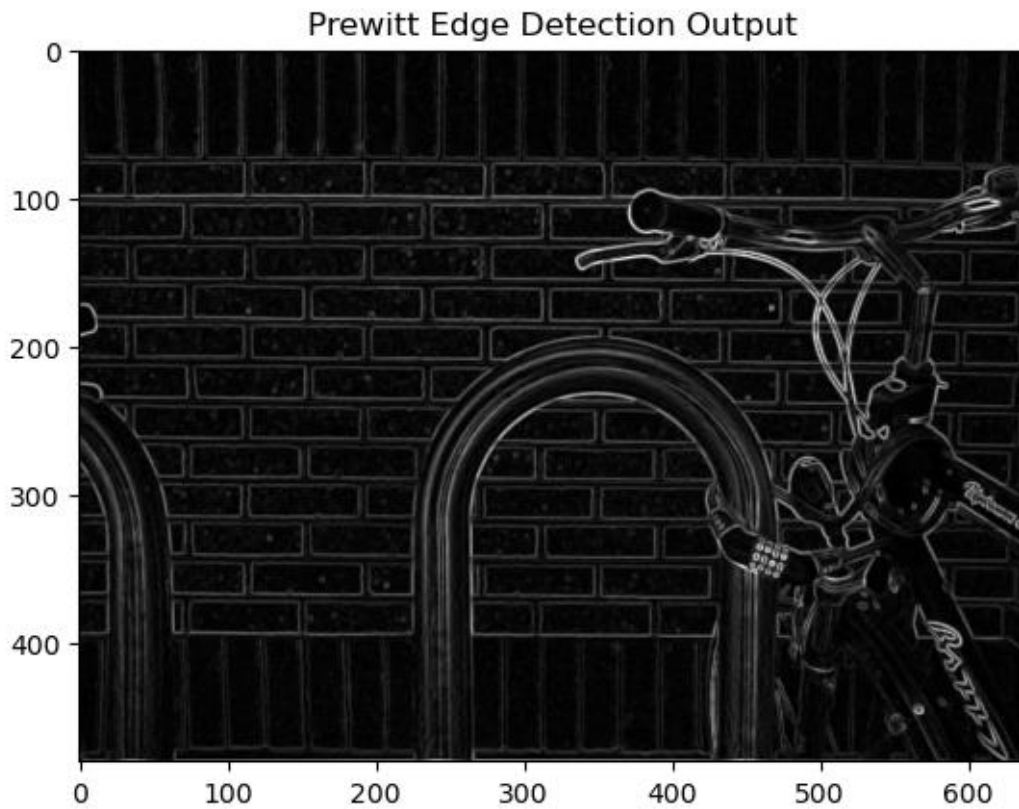


Figure 15: Prewitt edge detection applied gray scale image