Introduction

The project focused on implementing and comparing the performance of two different algorithms for edge detection. The first being multiscale LOG detectors and the second being Canny edge detectors. Multiscale LOG detectors work through generating a Laplacian pyramid from the difference in sharpness from a gaussian blur filter. Canny Edge detectors works by applying a applying a Sobel filter to a blurred image to detect the steep horizontal and vertical gradients and generate a gradient and angle magnitude image map. We then use the angle image map to help suppression the non-maximum values in the gradient image. Afterwards I applied the double threshold technique to filleter out weak pixel edge providing more definitive lines.

Design Approach

When it came to design my implementation of the code, I choose to make each function and independent and global function as what mattered to me more was applying and comparing this function in order of use. The multiscale LOG detector is done by my laplacian_pyramid(img) function. The Canny Edge detector has been broken up into 3 functions so that I can display intermediate stages of the filtering process.

Multiscale LOG Detector:
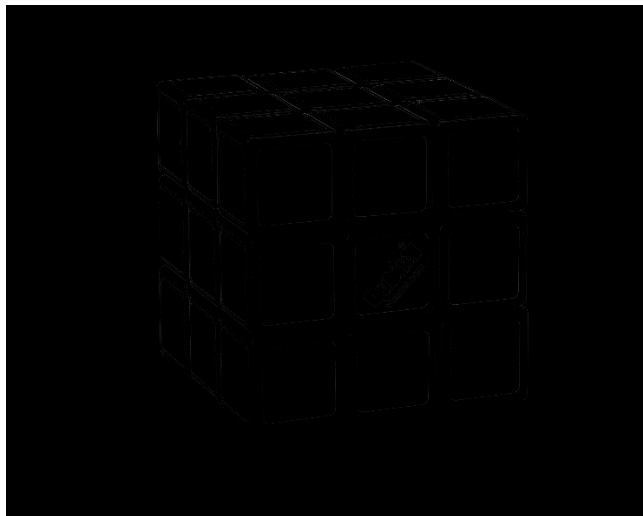   result_img = laplacian_pyramid(img)

Canny Edge Detector:
        G_img, theta_img = sobel_filters(img)
        nms_img = non_max_suppression(G_img, theta_img)
        result_img = and threshold(nms_img, lowThresholdRatio=0.2, highThresholdRatio=0.22)

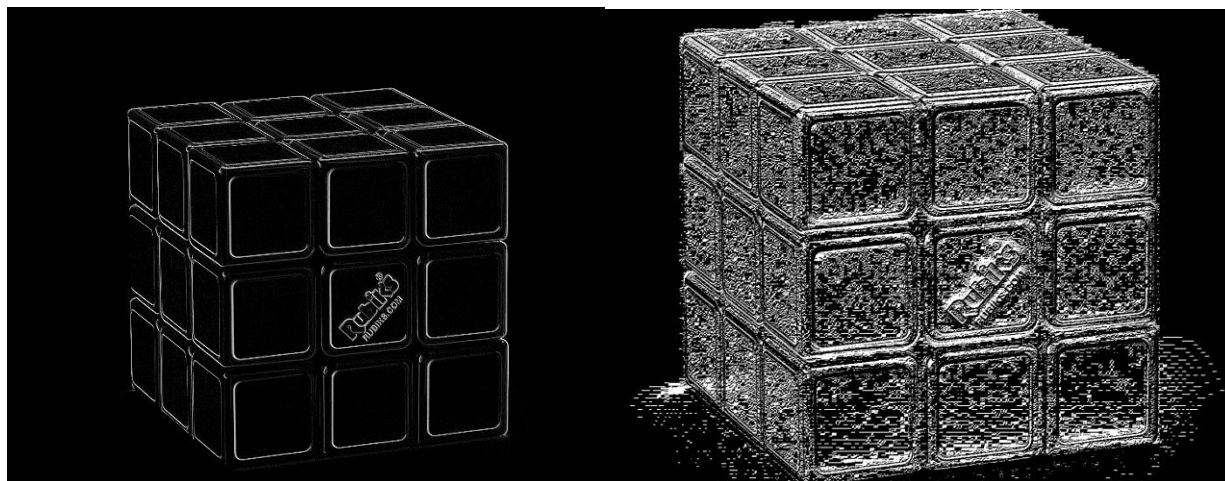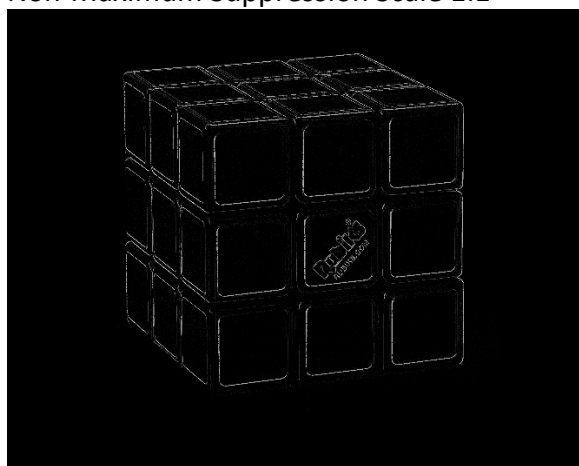# Experimental Results P1

LOG Scale 1:1

Gaussian Blur Scale 1:1
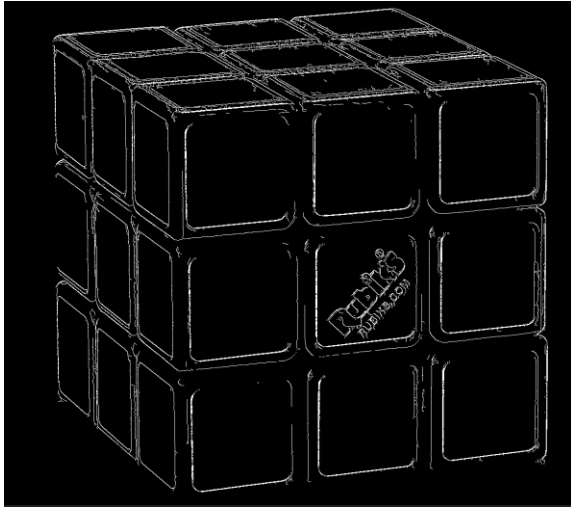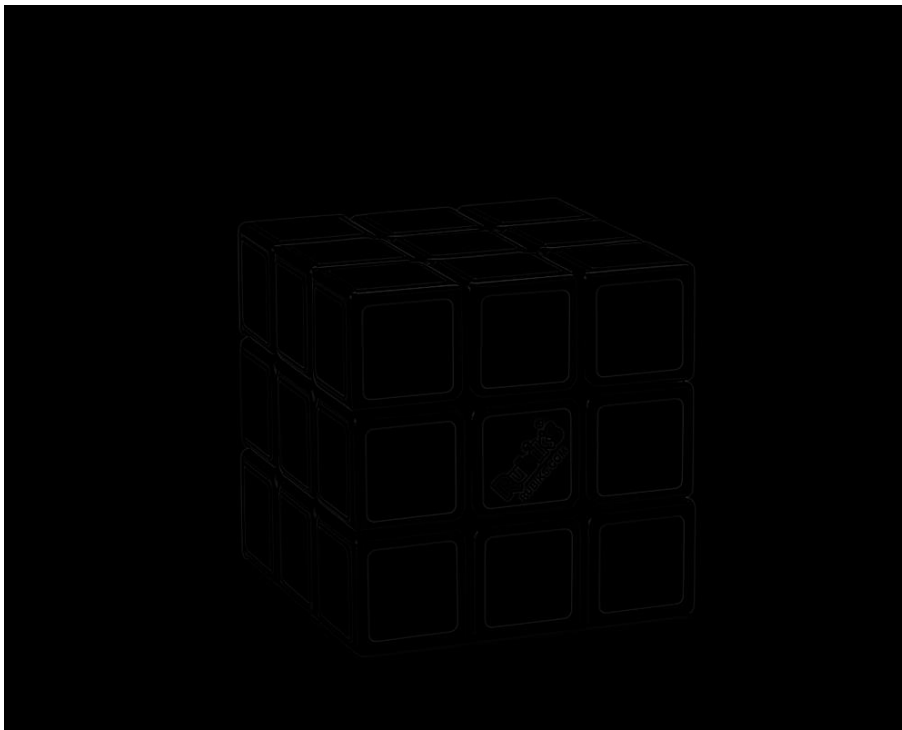

G & Theta Scale 1:1

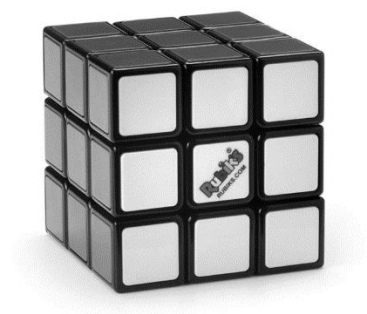
Non-Maximum Suppression Scale 1:1
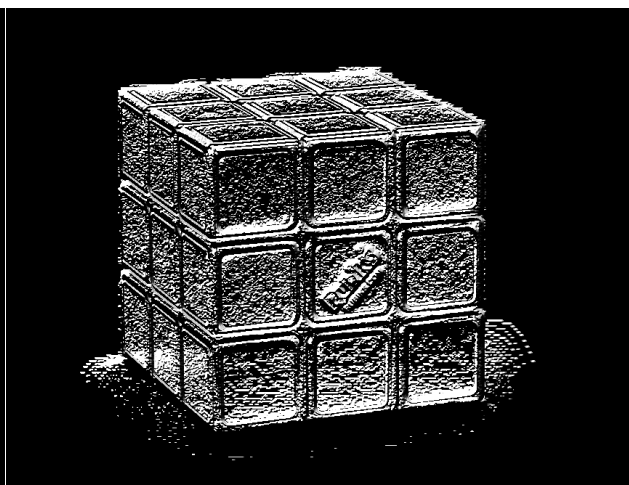

Double Thresholding Scale 1:1
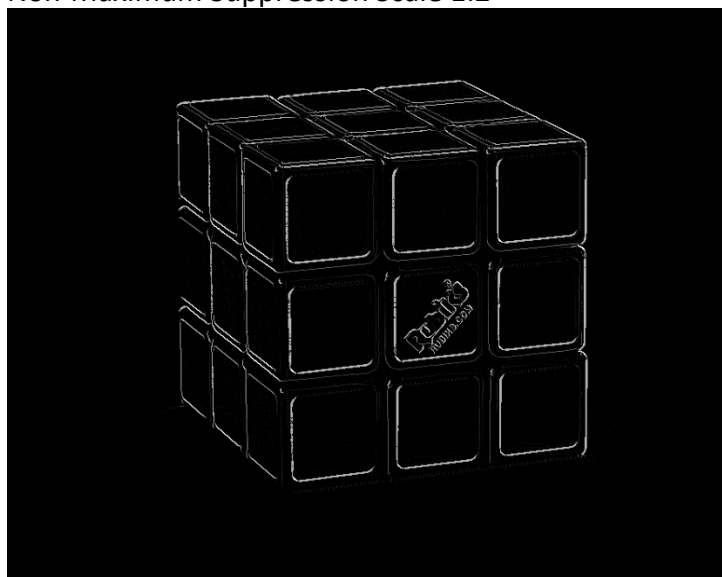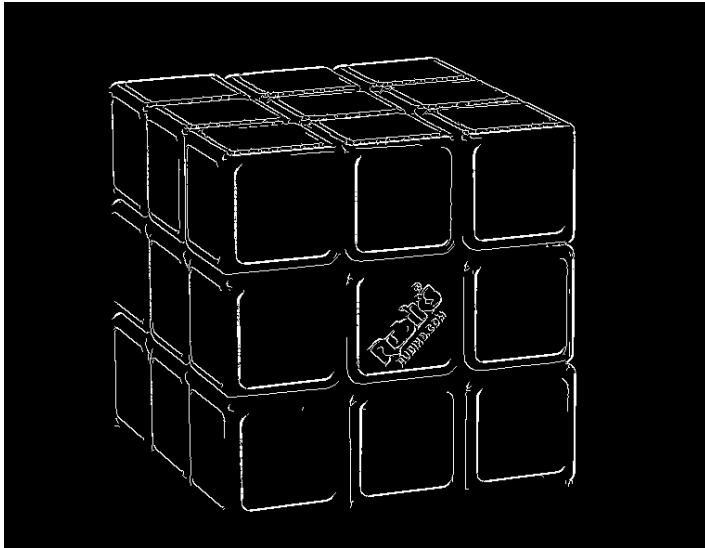
LOG Scale 1:2

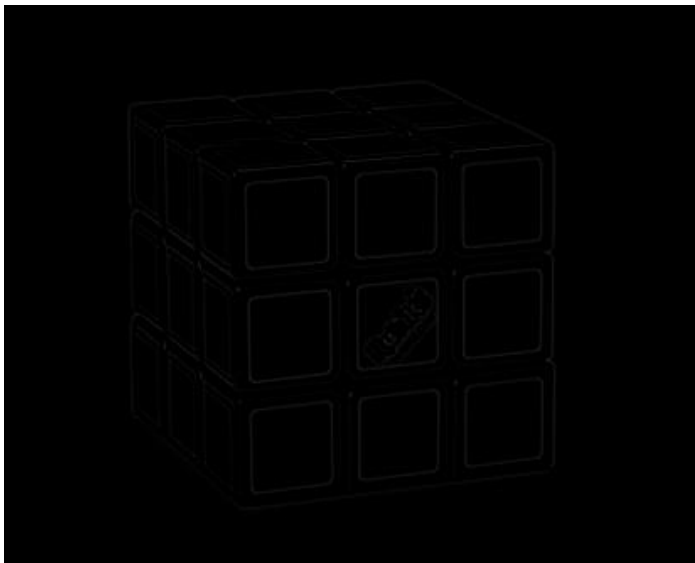Gaussian Blur Scale 1:2

G & Theta Scale 1:2

Non-Maximum Suppression Scale 1:2
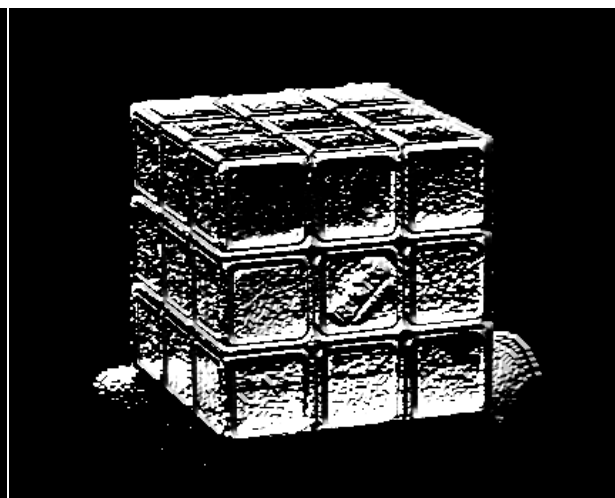
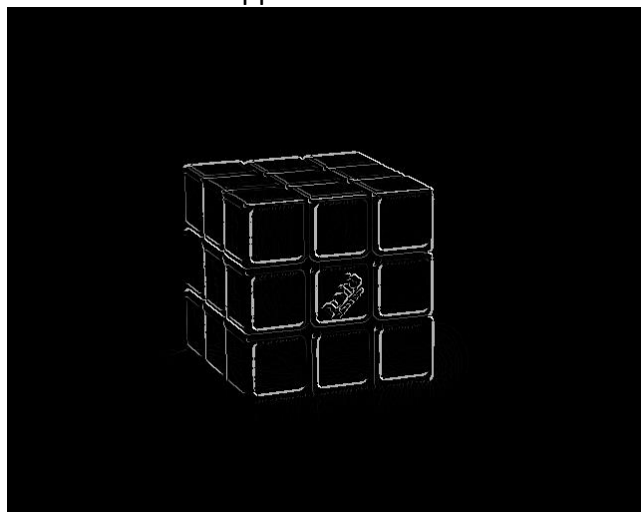Double Thresholding Scale 1:2

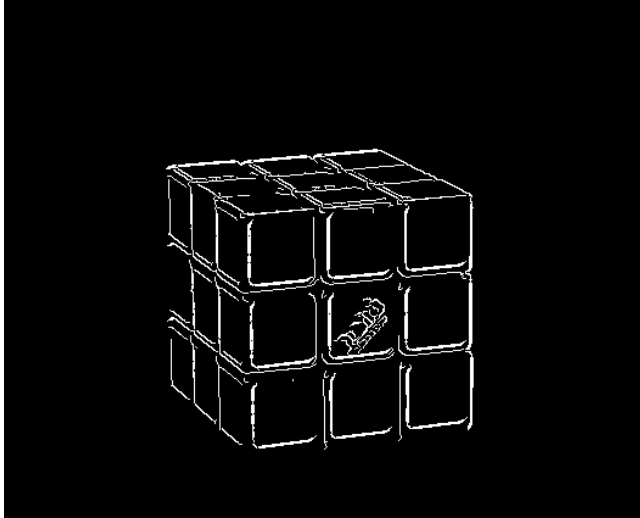LOG Scale 1:4

Gaussian Blur Scale 1:4
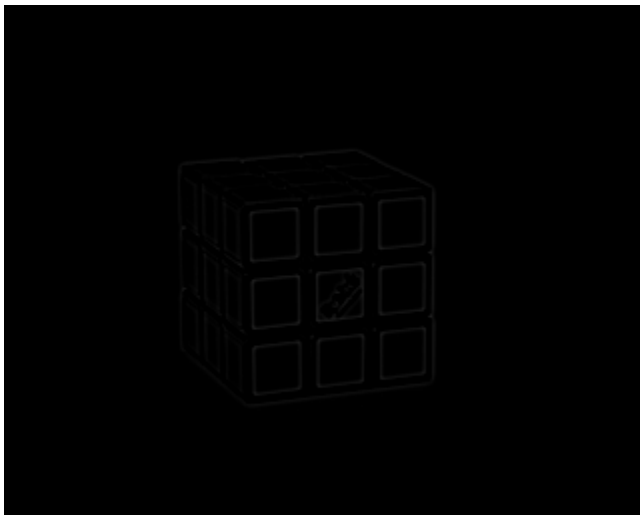
G & Theta Scale 1:4

Non-Maximum Suppression Scale 1:4

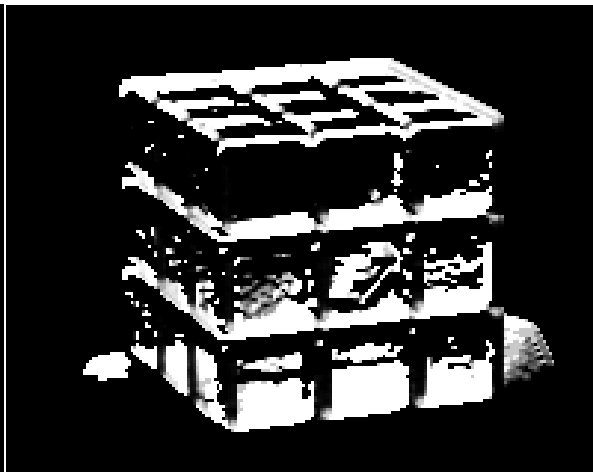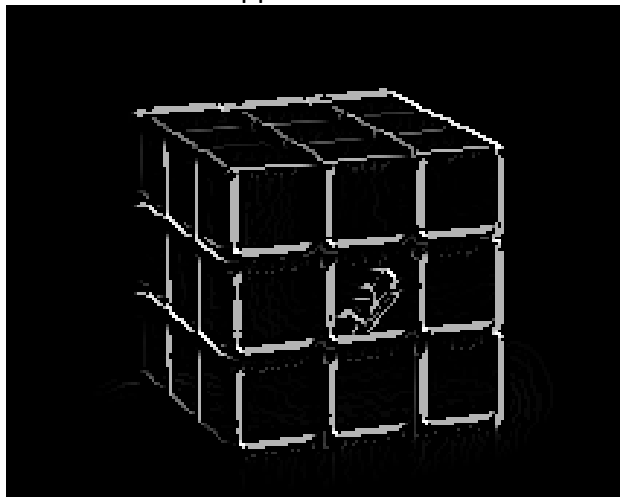Double Thresholding Scale 1:4

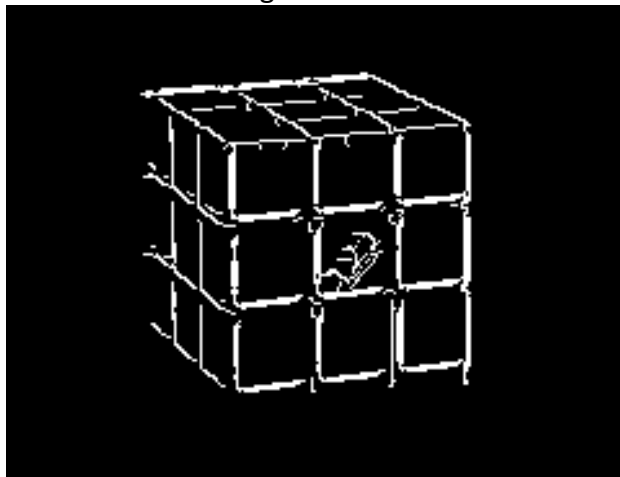LOG Scale 1:8

Gaussian Blur Scale 1:8

G & Theta Scale 1:8

Non-Maximum Suppression Scale 1:8

Double Thresholding Scale 1:8

During experimentation I found a lower threshold ratio = 0.2 and higher threshold ratio = 0.22 left the most distinct edges. From my results I believe the experiment was successful in displaying both algorithms. Though I found the LOG detector was easier to implement the edges found were very thin and defined, while the canny edge detection method resulted in very bold distinct and continuous lines.

Conclusion

In conclusion, this experiment has highlighted the powerful theories for image edge detection. The Canny Edge in my opinion provides a more robust algorithmic approach for finding the edge that also allows for tuning with the parameters compared to the LOG multiscale detector's I believe that my results, while not perfect, demonstrated the behavior and effects of each algorithm.