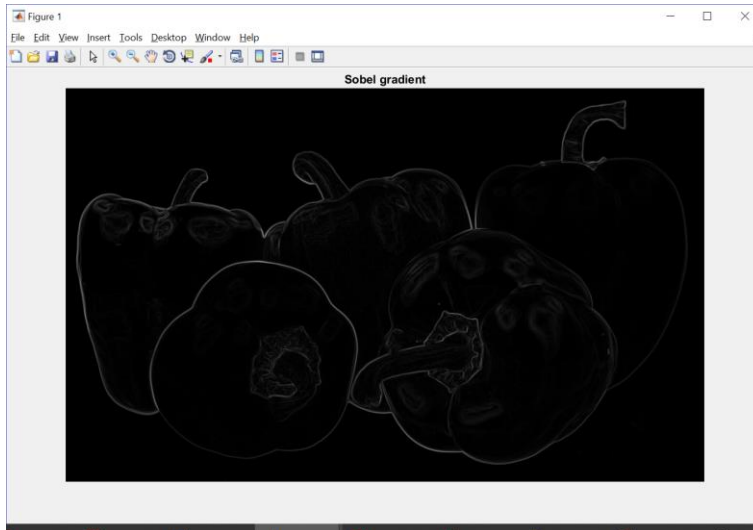


Programming

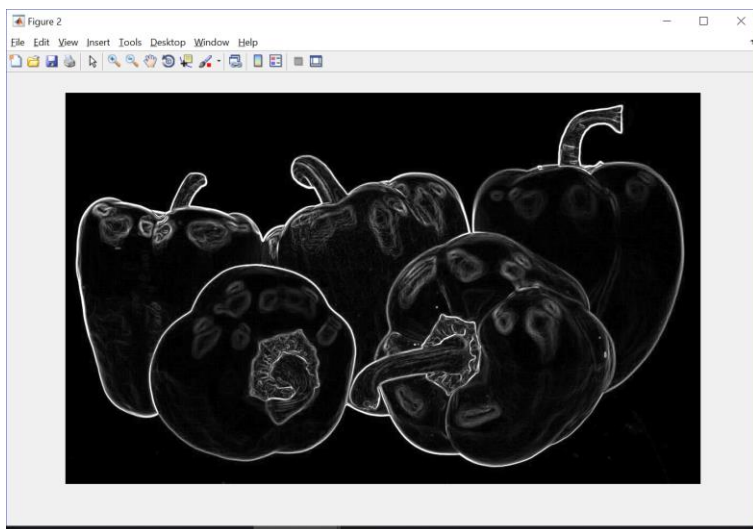
- A) i) The Sobel filter $\begin{bmatrix} -1 & 0 & 1 \\ -2 & 0 & 2 \\ -1 & 0 & 1 \end{bmatrix}$ is used to determine the edges of the object. Gradient is computed on x and y direction and their magnitude is calculated.

Result:



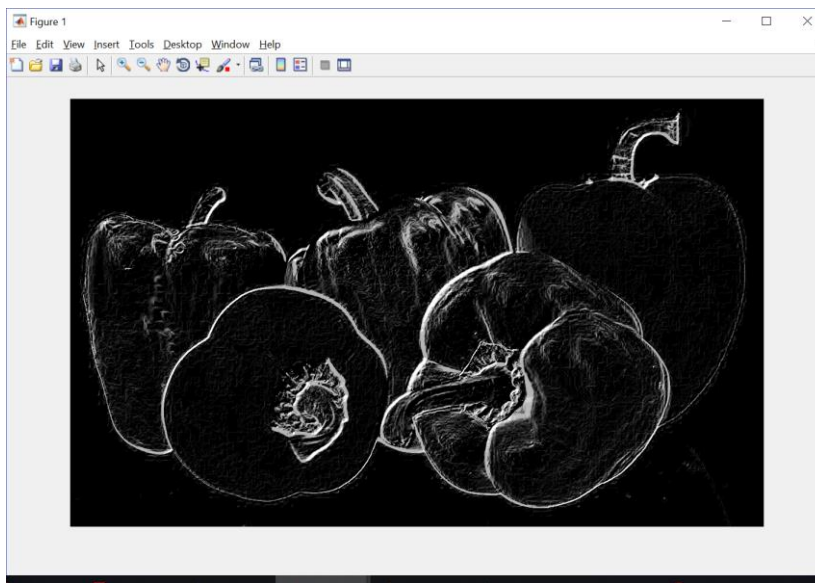
- ii) In this method, I have separated the color components RGB of the image and then performed the edge detection on each color component and then combined all the components to get the edges. As in the case i) I have computed the gradient in x and y direction separately and obtained the magnitude.

Result:



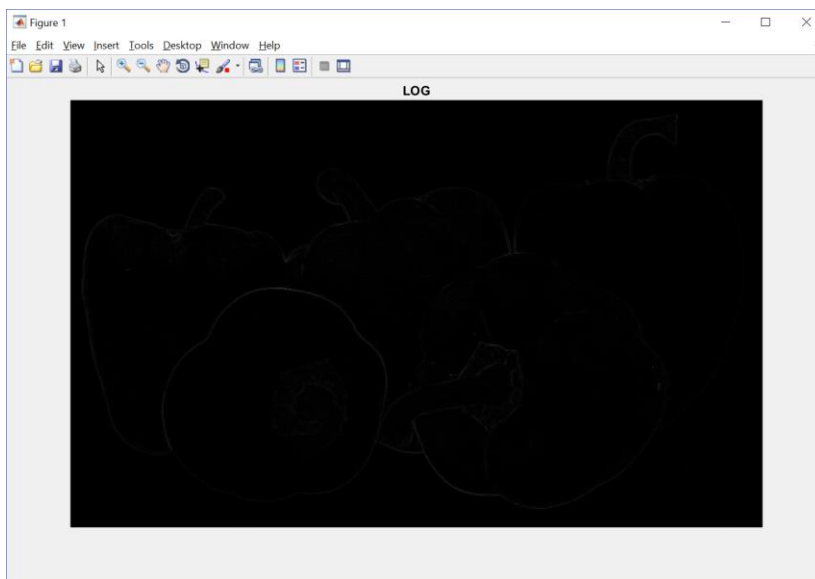
- iii) Here, I calculated the current pixel's value by taking the difference of previous and the next pixel in the image.

Result:



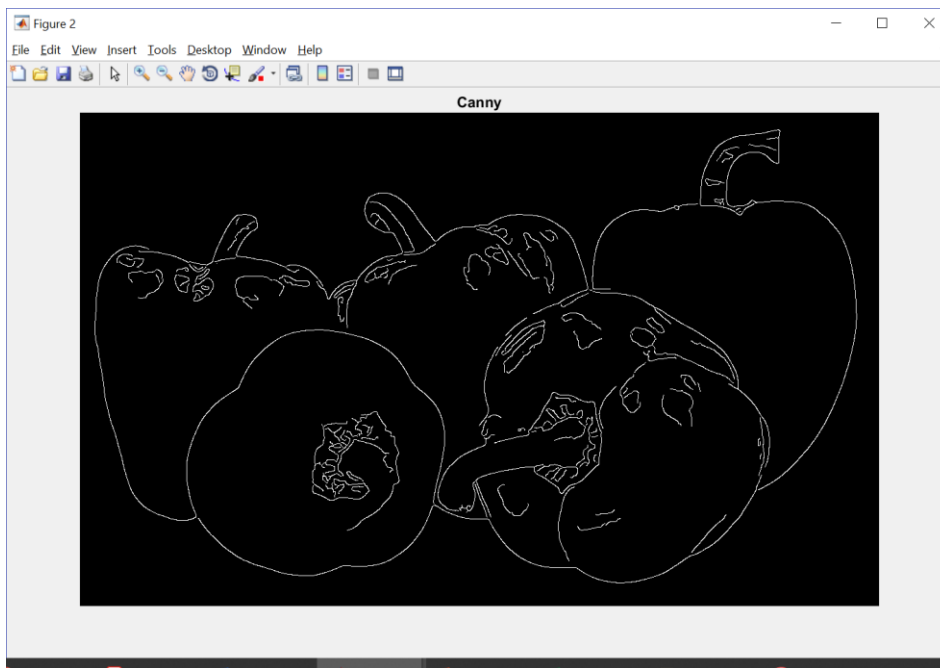
I tried Laplacian of Gaussian method and Canny edge detector as well and the results are below,

Result of LOG:



Using LOG filters and performs a Gaussian blur on the image, so there is less edge detected using this method.

Result of Canny:



Canny take alpha as the parameter to adjust the intensity of the edge detection.

From the above results, though the performance of case ii) i.e detecting edges on each component can be tuned by applying a threshold, canny method performs well in detecting the edges.

Note:

Programs are available in the thumb drive included.

Case i) - EdgeDetection1.m
Case ii) - EdgeDetection2.m
Case iii) - EdgeDetection3.m
Other method - LogCanny.m

- B)** To produce salt and pepper noise, I first calculated 20% of the whole image pixels, say k . A loop run till k and generated two random integers ranging from 1 to row length and 1 to column length to determine the pixel to populate salt and pepper noise. Salt = 255, pepper = 0.

I used median filter with the mask size 7×7 to filter out the salt and pepper noise. If we use a 3×3 mask, it clears the noise but leaves out a few.

Image with 20% salt and pepper noise

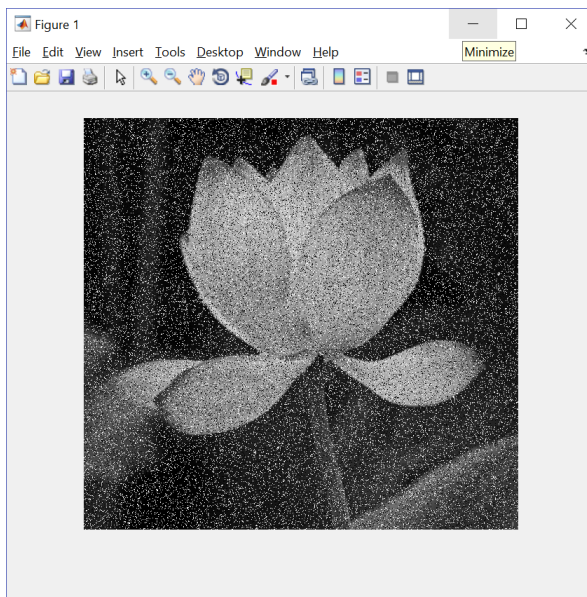
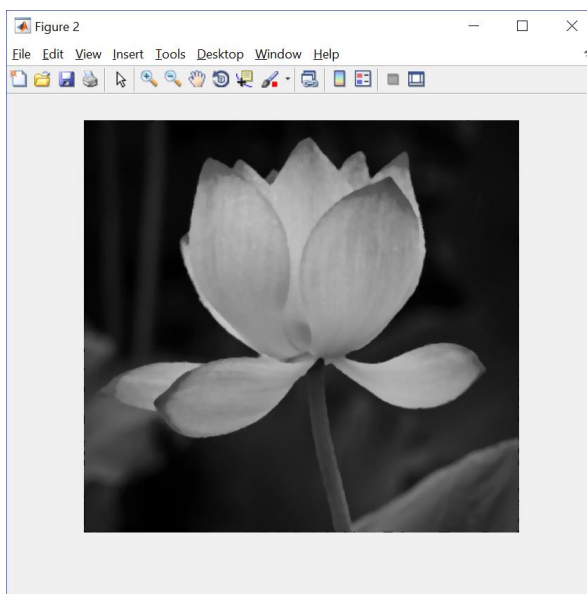
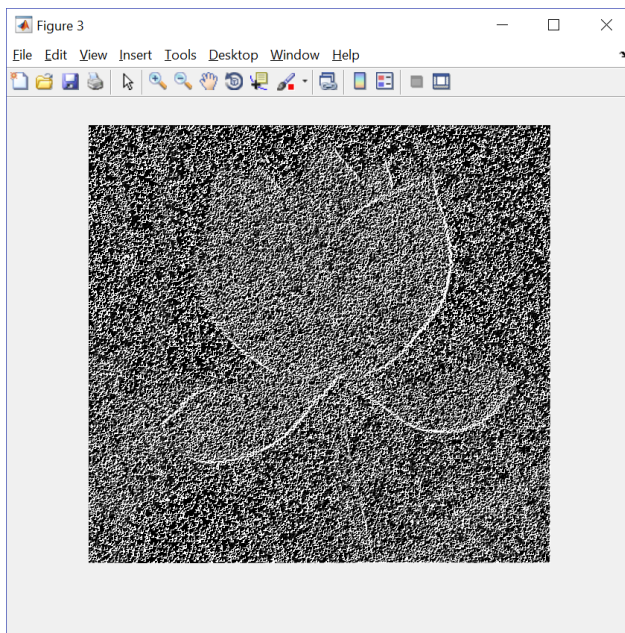


Image after applying median filter



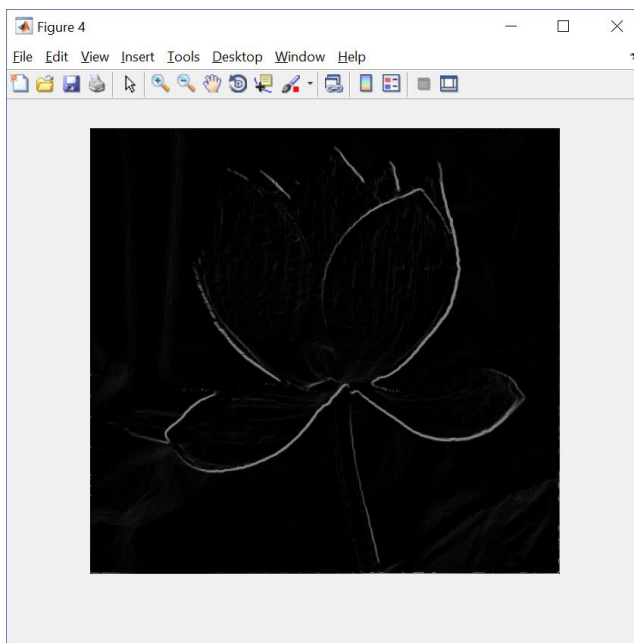
On performing edge detection with salt and pepper noise, these noises are also considered as edges as they are sudden changes.

Image of edge detection with noise.



The performance of the edge detection is considerably high in the image without noise

Image of edge detection after filtering noise.



I tried the above with different percent of salt and pepper noise, every time the noise is detected as the edges when they are not filtered out. So, while performing edge detection, the image should be clear of these noises to get better result.

Code is in the file – NoiseAndEdge.m