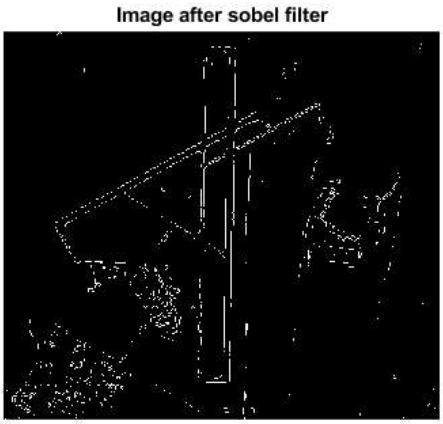
EE4211 Assignment 2

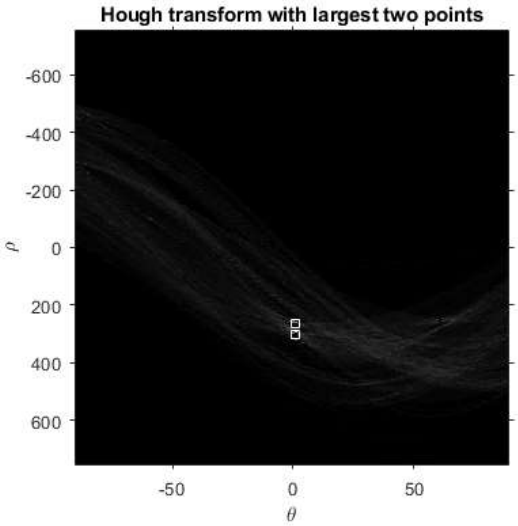
Question 1:

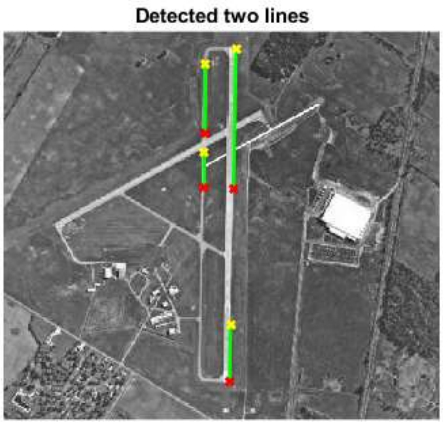
Codes:

See attachment q1.m in the .zip file

Result:





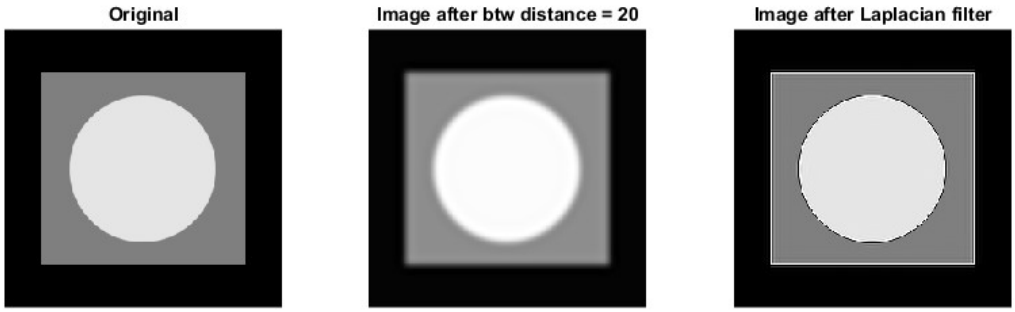


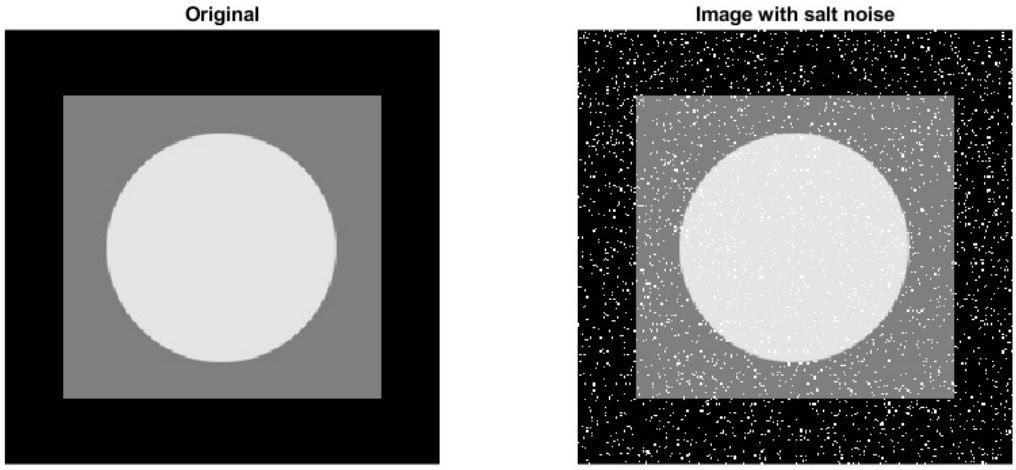
Question 2:

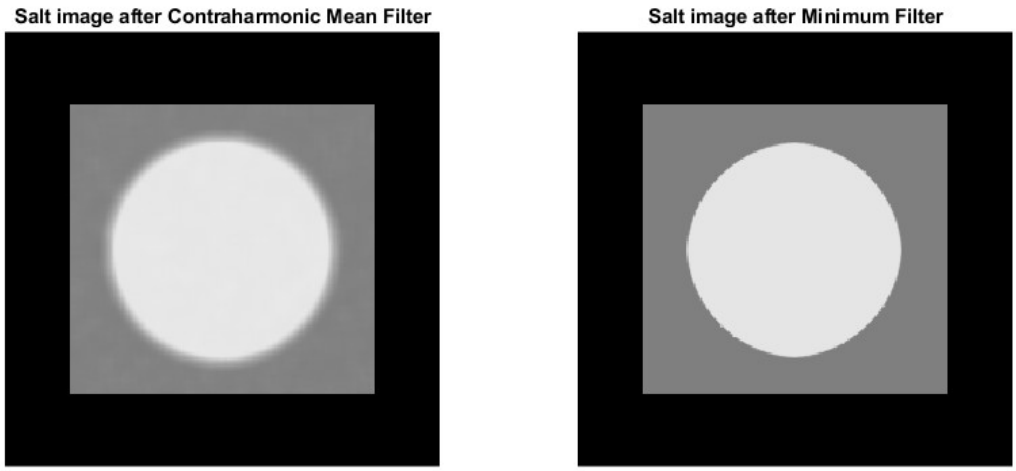
Codes:

See attachment q2.m in the .zip file

Result:







Question 3:

Filter A – Image 3, it is a $-45°$ Filter, so it responds to lines in this direction.

Filter B – Image 6, it is a $45°$ Filter, so it responds to lines in this direction.

Filter C – Image 1, it is a Horizontal Filer, so it responds to lines in this direction.

Filter D – Image 2, it is a Vertical Filter, so it responds to lines in this direction.

Filter E – Image 5, it is a Laplacian Mask which will highlights edges and other discontinuities.

Filter F – Image 4, it is an Average Filter, which will blur the image.

Question 4a:

The Gaussian low pass filter removes high frequency information and allow low frequency information to pass though while having the advantage of no ringing effect, which can be used for smoothing image.

While the Gaussian high pass filter removes low frequency information and allow high frequency information to pass though while also having the advantage of no ringing effect, which can be used for sharpening the image.

When two filter are used one after another, it became a Gaussian band reject filter which allows frequencies outside of the given range are passed while frequencies inside of the given range are blocked, with the transition between unfiltered and filtered frequencies is very smooth.

With this filter, only the pixels with relatively bright or dark are remained, otherwise were filtered. Thus, the ring appears so bright and solid.

Question 4b:

The result would be the same if the order of the filtering process had been reversed as it would still produce a Gaussian band reject filter.

Examples from MATLAB:

See next page

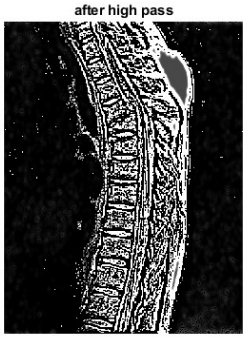
original

after low pass

after high pass

original

after high pass



after low pass