COMP4421 (Fall 2018)

Assignment #1

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I. EXERCISES

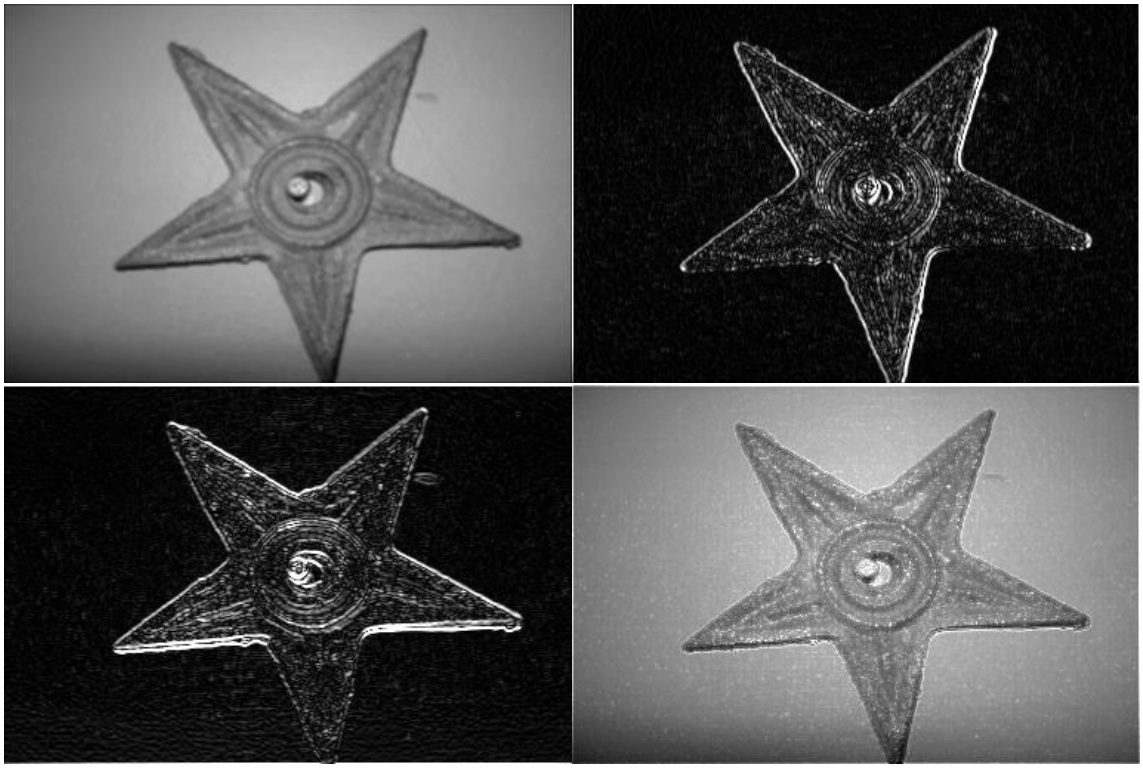
1) Solution:

a) The newly padded image contains sharp gradient changes when the original image goes into the black border. The horizontal and vertical edges of the black border corelates to the vertical and horizontal axes in the frequency domain correspondingly.

b) The new black border's color is uniform throughout, which is represented in low frequency signal. Therefore, there is an increase in signal strength in the low frequency region.

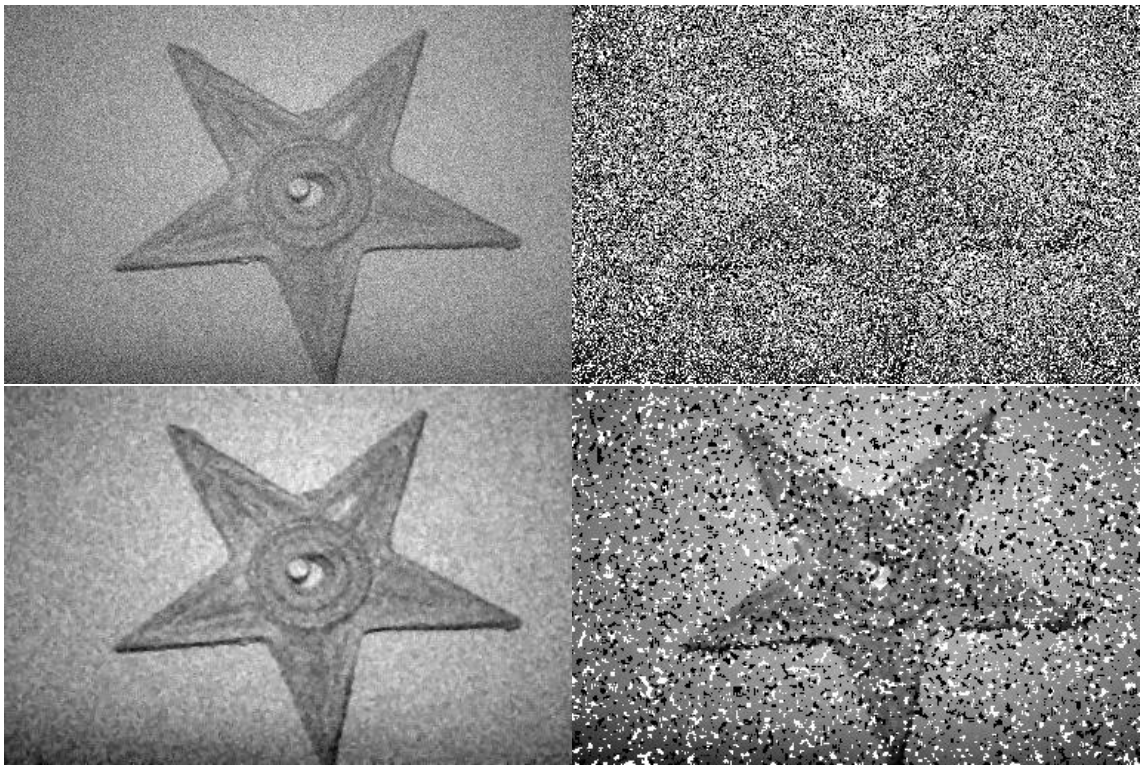
II. PROGRAMMING TASKS

1) Task 1: Spatial Linear Filtering



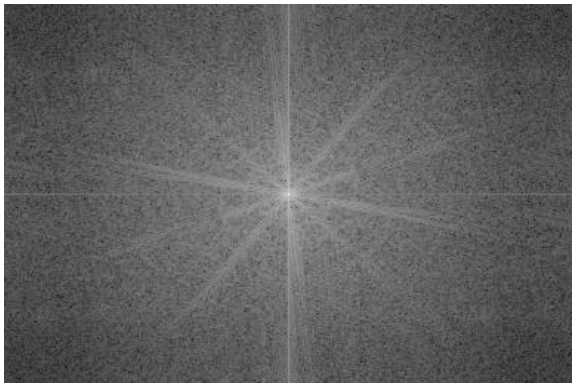
(img_ave.png, img_dx.png, img_dy.png, img_sharpen.png)

2) Task 2: Spatial Non-linear Filtering



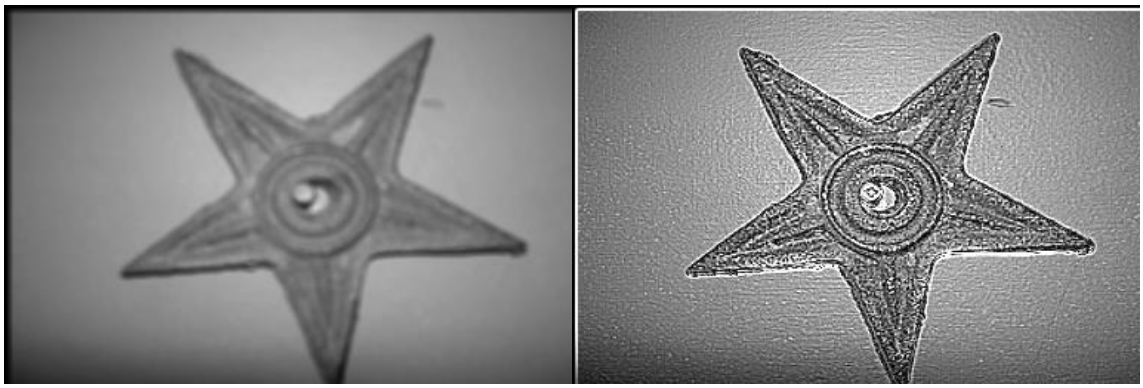
(img_gau.png, img_sp.png, med_gau.png, med_sp.png)

3) Task 3: Discrete Fourier Transform



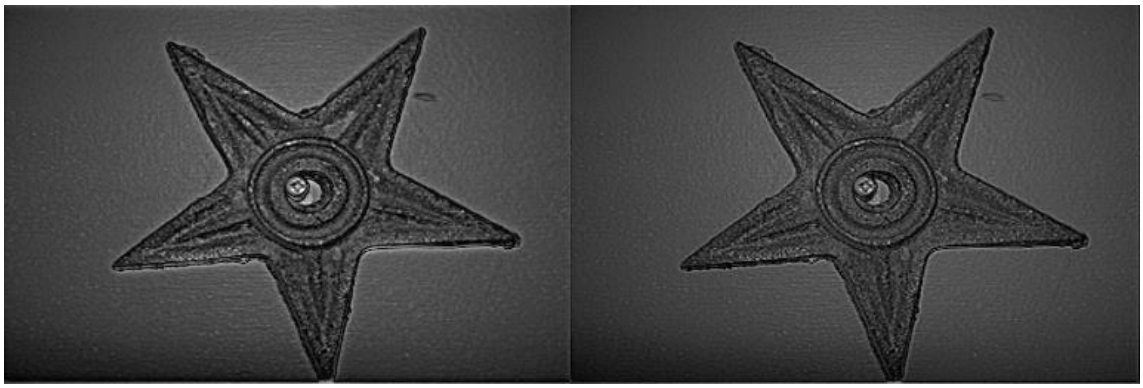
(dft_spectrum.png)

4) Task 4: Filtering in the Frequency Domain



(img_ave_freq.png, img_sharpen_freq.png)

5) Task 5: High Frequency Emphasis



(butter_emphasis_0.5_2.png, gaussian_emphasis_0.5_2.png)