Assignment 5 Question 3 Report

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1 Part A

- In this part, we have to plot the log magnitude of the Fourier transform of the image given to us.
- For this, we use the fft and fftshift functions of MATLAB.

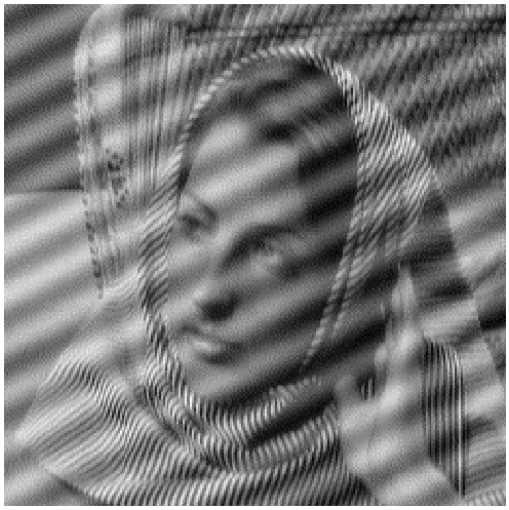

Figure 1: Original Image

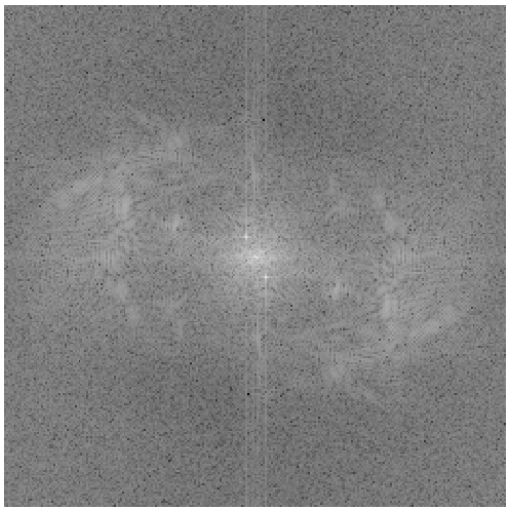

Figure 2: Fourier Transform with log magnitude

2 Part B

- Here, we can see that the noise in the original image is slanted from bottom left to top right in the regular fashion.
- Hence, we can expect the noise in the Fourier transform at the top left and correspondingly, the bottom right.
- Due to the regularity in the noise pattern, we would expect some kind of delta function in the noise pattern.
- If we look closely at the Fourier Transform, we can see 2 small dots to the bottom right and top left of the centre. They represent the noise in the image.
- To remove them, we use a notch filter in the form of two circles centred at the dots with radius of our own choosing.
- The centre of the circles are at (118,123) and (138,133), which are gotten by looking at the matrix values. The radius is chosen as 5.

3 Part C

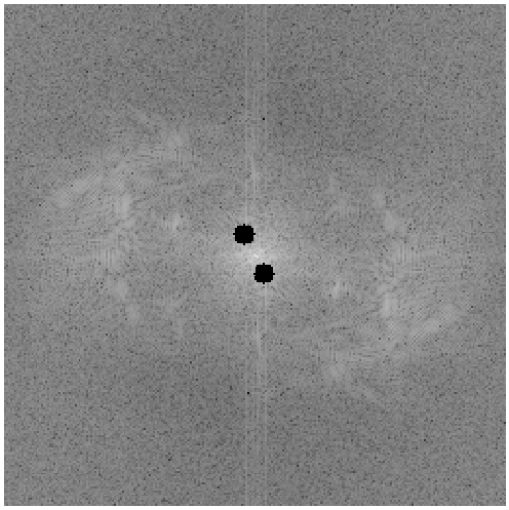

Figure 3: Log Magnitude Fourier Transform after Notch Reject Filter

- As discussed before, we apply a notch reject filter to the Fourier Transform of the original Image. The resultant Log Magnitude Fourier Transform is shown above.
- to invert it back into a real image, we use the ifftshift and ifft functions of MATLAB. The original image is shown below.

Figure 4: Image after Notch Reject Filter

4 Conclusions

- Hence the notch reject filter has removed almost all the noise though a little noise can still be perceived by looking closely at the edges of the image.
- Hence we have designed a notch reject filter to remove low frequency noise from an image.