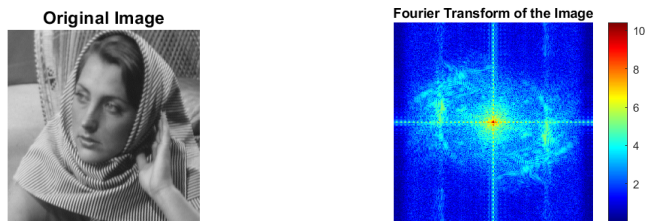# CS663: Digital Image Processing - Homework 3

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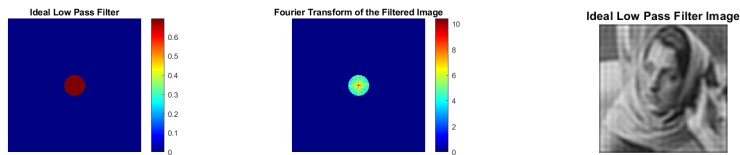
October 1, 2024

1   Homework 3 - Question 1

For both the parts of the question, we have performed filtering for parameter values 40 and 80 after doing appropriate padding. The results are shown below.
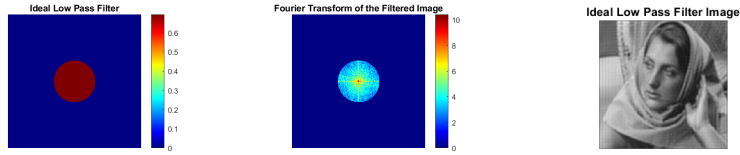

Original Image

Fourier Transform of the Image

(a) Ideal Low Pass Filter

For cutoff frequency 40:

Ideal Low Pass Filter

Fourier Transform of the Filtered Image

Ideal Low Pass Filter Image
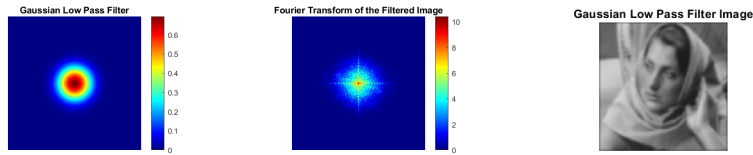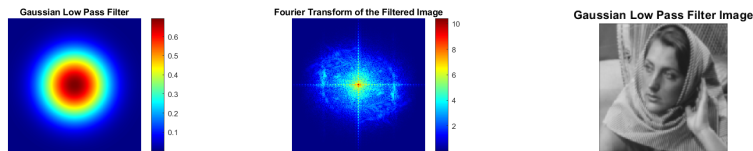
For cutoff frequency 80:

Observations:

- As the cutoff frequency increases, it maked higher frequency components visible. This is evident from the fact that the image becomes more sharp as the cutoff frequency increases.
- There is a presence of ringing artifacts in the filtered image.
- Elimination of high frequency components beyond cutoff frequency.

(b) Gaussian Low Pass Filter

For $\sigma = 40$:

For $\sigma = 80$:

Observations:

- As the value of σ increases, the image becomes more sharp.
- The ringing artifacts are less prominent in the Gaussian filter as compared to the ideal filter.
- Weakening of high frequency components (contrary to elimination). Hence, the Gaussian filter is more smooth as compared to the ideal filter.