Advanced Image Processing (IT507)

Assignment 5

April 13, 2022

1 Instructions

- Implement the following problems in Python or MATLAB.
- **Do not copy code from any source.**
- Prepare a report based on the theory and observations (one report per group).
- Submit the report (PDF format) in the Google Classroom within the deadline.
- The assignments will be evaluated on Monday from 5:30 PM to 7:30 PM.

2 Problems

1. Find out and show the Magnitude and Phase information of the *cameraman* image (Fig.1). Perform log transformation on the magnitude spectrum and show the result. Discuss the reason of difference between the observations (with log and without log transformation). Observe the significance of DFT coefficients of the image by reconstructing the image with higher frequency coefficients and lower frequency coefficients, separately without changing the phase information. *[Tips:Use FFT for finding out the DFT coefficients.]*

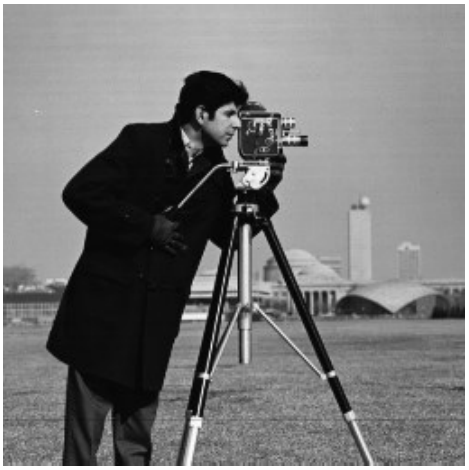

Figure 1

2. Demonstrate the significance of magnitude and phase information by reconstructing an image with the magnitude of Fig.2(a) and phase of Fig. 2(b). Repeat the experiment with the magnitude of Fig.2 (b) and phase of Fig.2 (a). *[Tips: First of all resize the images to create same dimensional images]*

Figure 2

3. Implement low pass and high pass filters in frequency domain for Ideal, Butterworth (order 2), and Gaussian kernels and apply those on Fig.1. Discuss about the results.

4. Consider the image of Fig.1, and implement unsharp masking and highboost filtering in frequency domain. Compare the results with the implementation of spatial domain operation. Tune the parameters (cut-off frequency for frequency domain, kernel size for spatial domain, etc.) to achieve the same results in both domains. Report the results.