Department of Electronics and Electrical Engineering
Indian Institute of Technology Guwahati

Lab Sheet 4 (Basic Image Processing)

EE533: Communication and DSP Laboratory February 2, 2021

---

1) Write a function to manually read an RGB image and convert it to a greyscale image.
2) Create a MATLAB GUI to implement Gamma correction on an image using a slider.
3) Manually calculate the histogram of a greyscale image and write a code to perform histogram equalization on the image.
4) Implement the following spatial image filters and comment on the effects
    a) Laplacian
    b) Gaussian smoothing
    c) Median Filtering
5) Implement the three filters from the previous questions in the frequency domain using the 2D DFT and using the 2D DCT.
6) Add salt and pepper noise to the image in question and perform the filtering operations from questions 4 and 5, and comment on the PSNR (peak signal to noise ratio) with and without filtering.
7) Implement the following algorithm
    a) Take the DCT of an image.
    b) Choose only the first K low frequency components and force everything else to zero.
    c) Reconstruct the image using these low frequency components and calculate the PSNR.
    d) Plot the PSNR as a function of K and record your observations.
8) Repeat Question 6 using 8×8 blocks of the image.