Assignment 1

Marks (10 in total)

Q1. (5 marks) A mini project of Image Interpolation

Write a MATLAB program to apply the bilinear interpolation. Download Figure 2.20 (a), M(3692)×N(2812), from the textbook web site as the testing image, then

    a) Resize the testing image to 0.5M×0.5N and 0.125M×0.125N, respectively;

    b) Resize the 0.5M×0.5N and 0.125M×0.125N images back to the original size of M×N, respectively.

As a minimum requirement of your mini project report, you should use MSE (Mean Square Error) and PSNR (Peak Signal to Noise Ratio) to compare your results obtained from step b) with the original Figure 2.20 (a). Then analyze your results and provide your observations and conclusions in a typed report.

Note: The Peak Signal to Noise Ratio (PSNR) is defined as:

$$PSNR = 10\log_{10}\left(\frac{G_{Max}^2}{MSE}\right),$$

where G_{Max}^2 is the maximum gray level of the original $M \times N$ testing image $f(x_i, y_j)$, and MSE is the Mean Square Error between $f(x_i, y_j)$ and the restored image $\hat{f}(x_i, y_j)$

$$MSE = \frac{1}{MN}\sum_{i=1}^{M}\sum_{j=1}^{N}\left[f(x_i, y_j) - \hat{f}(x_i, y_j)\right]^2.$$

Q2. (5 marks) A mini project of Histogram Equalization

Write a MATLAB program to compute the histogram of an image. Implement the histogram equalization techniques discussed in Chapter 3. Download Figure 3.8 (a) from the textbook web site and perform histogram equalization on it.

As a minimum requirement, your typed report should include the original testing image, a plot of its histogram, a plot the histogram-equalization transformation function, the enhanced image, a plot of its histogram, analyze and explain your results.

Please submit your assignment via Dropbox:

    I will send you a link of shared Dropbox folder to your UW email account.