

CS474/674 Image Processing and Interpretation

Fall 2018 – Dr. George Bebis

Programming Assignment 1

Due Date: 9/24/2018

For parts 1 and 2, use the “lenna” and “peppers” images; note that each one of them is a 256 x 256, 8 bits/pixel image.

1. Image Sampling

Write a program to change the spatial resolution to 128 x 128, 64 x 64, and 32 x 32 pixels. Resize the images back to the original size 256 x 256 images and print them for comparison purposes. Explain how your algorithm works.

2. Image Quantization

Write a program that would reduce the number of gray levels in a PGM image from 256 to: (i) 128, (ii) 32, (iii) 8, and (iv) 2. Explain how your algorithm works.

3. Histogram Equalization

- (a) Write a program to compute the histogram of an image.
- (b) Implement the histogram equalization technique. It is suggested that you debug your algorithm using a small “test” image (e.g., 5 x 5) to make sure that it works correctly.
- (c) Perform histogram equalization on the “boat” and “f_16” images.
- (d) Show and discuss your results (i.e., original images/histograms, output images/histograms).

4. Graduate Students Only: Histogram Specification

- (a) Implement the histogram specification technique. It is suggested that you debug your algorithm using a small “test” image (e.g., 5 x 5) to make sure that it works correctly.
- (b) Perform histogram specification on “boat” and “f_16” images. Assume that the specified histogram for the “boat” image is the histogram of the “sf” image while the specified histogram for the “f_16” image is the histogram of the “peppers” image.
- (c) Show and discuss your results (i.e., original images/histograms, specified histograms, output images/histograms).

Laboratory Write-up

For each programming assignment, you are to turn in a report (please, follow closely the instructions posted on the course's website). **The report is very important in determining your grade for the programming assignment.** Be well organized, type your reports, and include figure captions with a brief description for all the figures included in your report. Motivation and initiative are greatly encouraged and will earn extra points.