

CS474/674 Image Processing and Interpretation

Fall 2009 – Dr. George Bebis

Programming Assignment 2

Due Date: 9/22/2009

In this assignment, you will experiment with histogram equalization, histogram specification, and median filtering; the graduate student will also experiment with unsharp masking, and high-boost filtering.

1. Histogram Equalization

- (a) Write a computer program to compute the histogram of an image.
- (b) Implement the histogram equalization technique.
- (c) Use three different PGM images and perform histogram equalization on them.
- (d) Show your results (i.e., original images/histograms, output images/histograms).
- (e) Discuss your results

2. Histogram Specification

- (a) Implement the histogram specification technique.
- (b) Use three different PGM images and perform histogram specification on them (experiment with specifying at least 2 different histograms per image)
- (c) Show your results (i.e., original images/histograms, output images/histograms).
- (d) Discuss your results

3. Median Filtering

- (a) Implement median filtering; the size of the filter should be a parameter.
- (b) Take two different PGM images and corrupt them with “salt and pepper” noise (i.e., randomly change X% of the pixels values to either black or white; for each image, use X=50 and X=70)
- (c) Apply median filtering to each of the corrupted images; for comparison purposes, apply averaging too.

- (d) Show your results both for median filtering and averaging.
- (e) Discuss your results

4. **Unsharp Masking and High Boost Filtering** (graduate students only)

- (a) Implement unsharp masking and high-boost filtering.
- (b) Use three different PGM images and perform unsharp masking and high-boost filtering. In the case of high-boost filtering experiment with different A values and choose the results that seem to be visually best.
- (c) Show your results both for unsharp masking and high-boost filtering.
- (d) Discuss your results.

Laboratory Write-up

For each programming assignment, you are to turn in a brief report including a print-out of your source code. Your report should include the following: a description of the experiments, theoretical background (i.e., what the reader needs to know to understand the experiments), methodology (i.e., explanation of the methods used), results (i.e., include graphic output of your results), explanation of results (i.e., justify your results and answer the questions that might exist in the handout), and a brief summary of what you have learned.

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!