Programming Assignment #2, CSC 416/616/712 Digital Image Processing (Spring 2023)

Due: 3:30 pm, Feb. 16

Image files are available on Canvas: Files >> 2_Data. You can choose either *.raw* or *.tif* file.

.raw: No image libraries are needed. However, it does not include any header information (e.g., image dimension and number of intensity levels). Thus, **you need to specify image dimension (# of rows x columns) and data type (e.g., 8 bit) when reading/writing .raw files.**
Also, the simple image viewer in Windows system may not work. For displaying them, use Photoshop or some free software for image display (e.g., ImageJ, https://imagej.nih.gov/ij/download.html).

.tif: You need image libraries depending on the programming language you choose.

Problem 1: Assigned to _ALL_ students.

Problem 2: Assigned to _Graduate_ (M.S. and Ph.D.) students. Undergraduate students who submit this will receive a bonus point.

Problem 1. Histogram equalization (10 points)

Write a program for <u>histogram equalization</u> by taking *lena* as an input. Export *lena_histequal* as an output file (in *.tif* or *.raw*).

Input*: lena* (512x512, 8-bit image)

Problem 2. Histogram specification (10 points)

Write a program for <u>histogram specification</u> so that *lena*'s histogram can be matched to the histogram of *lena_histequal* (the result of Problem 1). To simplify the problem, you don't need to perform histogram equalization before the histogram specification. Export *lena_histspec* as an output file (in *.tif* or *.raw*).

Inputs*: lena* (512x512, 8-bit image) and *lena_histequal* (512x512, 8-bit image from the Problem 1)

Submission: Submit a single ZIP file including your report, all source code files, executable, output images for all problems. Use *Yourname_HW2.zip* as your submission filename (e.g., *MinjeongKim_HW2.zip*).

In your report, you should include your programming environment (e.g., Visual Studio for C/C++), source code segments (i.e., the core function of your program) for all problems, and output images.

Here are some more requirements.
1) There is no restriction on the programming language (e.g., C/C++, Java or Python). However, extended libraries beyond basic ones (e.g., image file I/O and basic math functions) are not allowed.
2) The instructor and TA should be able to compile and run your source code. The test results by the instructor and TA should be same as your outputs in your submission.
3) The output images submitted by you should fit the given image size (i.e., same to the input image size) unless specified in your report.