Image Histogram

COMP 3301 — Assignment 1 Due: October 5, 2020 (Monday) 11:59 PM

Objectives:

In this assignment you will compute the histogram for an input image and implement algorithms for histogram stretch and histogram equalization. The goal is to let you practice with basic image handling functions in Java and give you a further understanding of histogram-based operations.

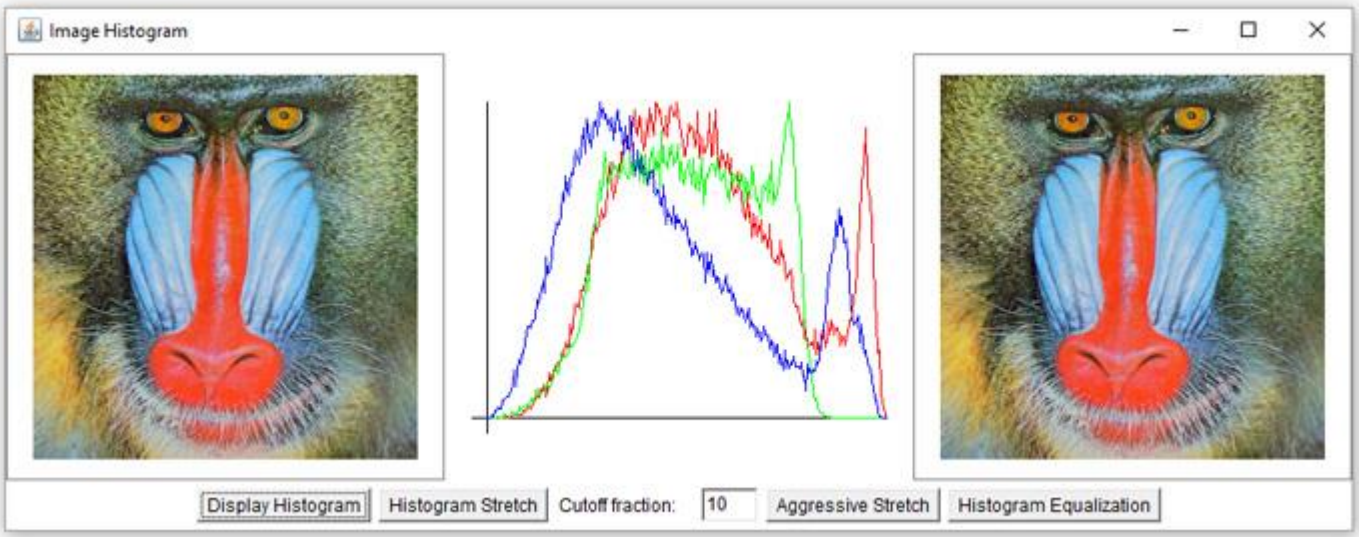
Your Task:

Your task is to compute the intensity histogram for each color channel of a given input image. Plot the histogram curves on the coordinate with proper scaling. Also implement three histogram-based operations: histogram stretch, aggressive histogram stretch, and histogram equalization on the input image and show the results. When processing color images, you should apply the above operations on the three color channels independently. However, for Histogram equalization of color images, they must be first converted to HSV and the equalization will be done on the grayscale image only.

Getting Started:

A skeletal program is supplied to get you started, which you are required to use as the basis of your solution. To run the program, put the test image in the same folder and provide an image name as an argument. The program opens a window that contains three panels, displays the test image in two of the panels, and plots a coordinate in the middle panel. As a demo, the program also computes the average image color and plots its location when the "Display Histogram" button is pressed.

The output of the program would look like this:



Grading:

Your program will be tested and graded using a standard Java environment. The grade will be based on your program's functionality (whether or not it works under different settings), as well as the efficiency of your implementation. The weights for different components are as follows:

- Plot histogram for each of the three color channels (20%)
- Result of histogram stretch operation (20%)
- Result of aggressive histogram stretch operation (20%)
- Result of color-preserving histogram equalization operation (20%)
- Automatically plot either one or three histograms depending on whether the input image is greyscale or RGB (number of color channels available) (10%)
- Implement the assignment using Netbeans (providing the complete project directory tree) (10%)

What and How to Hand in:

You are handing in the source of your program, as well as any data files required for running your program. For NetBeans, you must include the whole project folder, so that it can be opened directly as a self-contained submission, not just the source code files.

Your source code must contain sufficient internal documentation to facilitate grading. This includes your names, student numbers, a brief description of what the program does, which items you claim to have completed and a listing of known bugs, if any, at the top of the file. Send in your source program through the Direct2Learn Dropbox as a single .zip file. No late submission is allowed.

Verifying your submission:

Since late submissions are not allowed, you should be careful to make sure each of your submissions has been properly done. Once you have placed your assignment into the Dropbox, click on the link that indicates our submission has been done, download it, open it, revise the contents, test that the program you have submitted actually is the one intended (not the source files, for example), and if it does not correspond to what you want the TA to mark, you must resubmit again, until you are satisfied, the TA will only mark the last submission with the timestamp that is prior to the indicated deadline.