

UNIVERSITY OF CALIFORNIA, SANTA BARBARA
Department of Electrical and Computer Engineering

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ECE 178 Digital Image Processing

Fall 2017

Homework 2

Due Monday, October 16, at 9pm. Written portion due in the homework submission box, MATLAB portion due on GauchoSpace.
(please write your name and discussion section number clearly at top of first page)

1 Book Problems

1. 3.13
2. 3.14

2 MATLAB

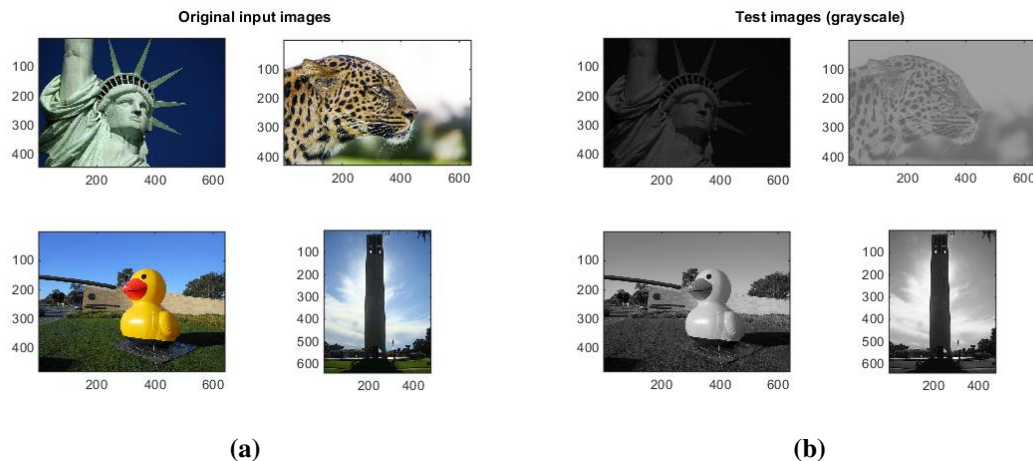


Figure 1: Original input images and their grayscale representation.

In this MATLAB assignment, you are going to implement Histogram Equalization as discussed this week in lecture 3. There are two ways of doing histogram equalization: **Linear Stretching** and **CDF Equalization**. Of the four test images given in this assignment, two of them work well with Linear Stretching and the other two work well with CDF. There are five .m files in the zipped file, but you only have to implement three functions (*plotMyHistogram.m*, *linearStretching.m* and *CDFmethod.m*). Note that it is **not allowed** to use the built-in *hist* or *histeq* functions for this HW, but other plotting functions (like *bar*) are allowed.

First, you will to implement a function *plotMyHistogram.m* that plots the histogram of a given image using the specified number of bins. It should give you a similar result to what the MATLAB function *hist* would give you, but again, only use this for comparison purposes—you are not allowed to use this function for your homework submission. We want you to compute the values to plot for each bin, but for the actual plot you are free to use functions like *bar*.

Next, you will write two histogram equalization functions. For the *linearStretching.m* function, there

are four inputs: the image input *input_img*, the starting intensity *start_intensity*, the end intensity *end_intensity*, and the scale to use for stretching *stretching_x*. For the *CDFmethod.m*, the function handles only one input: the image *input_img*.

The main function is *HW2_main.m*. It operates as follows: First, it loads the original images and converts original images (see Figure 1) to the test images. Then, the main script shows you the histogram of these test images (as in Figure 2) after you implement your *plotMyHistogram.m* function.

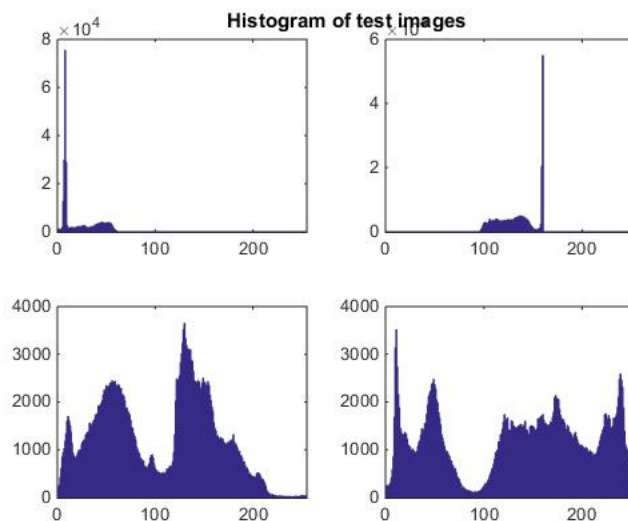


Figure 2: Histograms for the test images.

Once are you finished implementing all three functions for the assignment, the main script *HW2_main.m* will also display the results you get. It should look like the results in Figure 3.

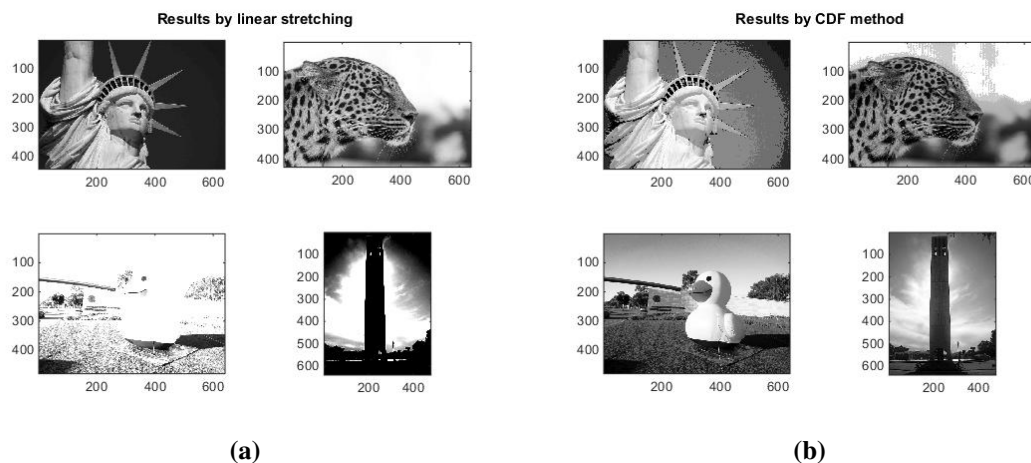


Figure 3: (a) Output images from *linearStretching.m* (b) Output images from *CDFmethod.m*

For submitting your code, please upload one zipped file includes only **three** files (*plotMyHistogram.m*, *linearStretching.m* and *CDFmethod.m*). You **don't have to** attach your result images. Please use the following convention to name the zip/tar files: <Perm number>_<First name>_<Last name>_HW2. Good luck!