INTRODUCTION TO IMAGE PROCESSING

2014-2015 – FALL

DUE : 20 October 2014

HOMEWORK 1

Submit ONE SINGLE PDF FILE on DYS. Any material that is not in your PDF document will NOT be graded.

Label all axis for plots and bars. Put a descriptive title on plots, bars and images.

Include all the MATLAB code in your homework (in the PDF file).

Display the original and processed images in your homework. Put informative captions under the images.

Each homework should be done individually. You will suffer a significant GRADE REDUCTION if you submit very similar material.

PART 1

Generate an RGB image in MATLAB of size 256x256. The background should be pure white. There should be a red circle of radius 60 and a green rectangle of height 150 and width 80. You can place the circle and the rectangle anywhere in the image as long as they don't overlap. Display the image you have generated. Include the MATLAB code.

PART 2

Read the **Lena.bmp** image. Convert it to a grayscale image by first converting the data to double, then taking the average of the R, G, and B components. (DO NOT use the MATLAB function rgb2gray). Display the grayscale image and its histogram. Apply gamma transformation for **(a)** $\gamma = 2$, **(b)** $\gamma = 3$, **(c)** $\gamma = 0.5$, **(d)** $\gamma = 0.2$. Display the resulting images and their histograms for all the four cases. Include the MATLAB code.

DO NOT use the MATLAB function imadjust. You should write your own gamma transformation code. Remember to scale the gray values between 0 and 1 before applying the gamma transformation. Then rescale the resulting values between 0 and 255 and convert to uint8.

PART 3

Read the **circles.jpg** image. Convert it to grayscale. Apply binarization to the image for thresholds 80, 120, 140, and display the results (DO NOT use the MATLAB function im2bw). Inspect the histogram of the grayscale image. What will be the best threshold to separate the objects from the background? Use that threshold and display the result. Include the MATLAB code.