CAP 5400 – DIGITAL IMAGE PROCESSING

Assignment 2

The purpose of this homework is to experiment with histogram modification and color processing

Your program should be able to do the following:

1. Histogram modification [4 points]
   - Add histogram stretching for grey level images to your choice of options
   - Stretching is defined by user provided intensity range parameters (a, b): stretch the intensities in the range between a and b on the input image to the range of 0 to 255 as output. [0,a] -> 0, [a,b] -> [0,255], [b,255] -> 255
     - Your program should apply the procedure within ROI (up to three ROI as Hw1)
     - Generate image of the histograms for the ROI before and after the procedure, this is good for debugging and illustrations
   - Test your program on some grey level images
   - [extra credit - 1 points] Implement general bilinear histogram stretching (parameters of input [a,b], and of output [c,d]) and discuss performance. [0,a]->[0,c], [a,b]->[c,d] and [b,255]->[d,255]

2. Implement Optimal thresholding algorithm (as discussed in class) [3 points]
   - Implementation should be within ROIs
   - Initialize threshold using median (in ROI) value
   - Test on several grey scale images and ROIs

3. Combining image analysis operations [3 points]
   - Combine histogram stretching with optimal thresholding by
   - Performing optimal thresholding within ROI. That will segment ROI into two subregions: Background and Foreground
   - Apply histogram stretching to Background and Foreground separately and combine in one image
   - For histogram stretching use a=min_intensity in the subregion and b=max_intensity in the subregion
   - Test on several grey scale images and ROIs
   - [extra credit - 1 point] Perform histogram stretching on both I and S components. How about including all three I, S and H components? Experiment.

Make sure that you have complete report for this assignment (not just few comments).

- Include input and output images (use several gray level images).
- Discuss performance of histogram processing on grey level images.
- Discuss performance of the thresholding algorithm.
- Discuss performance of combined algorithm.

How to submit

- Submit paper report in class on the due date
- See TA help desk for instruction on program submission and testing.