CAP 5400 – DIGITAL IMAGE PROCESSING

Assignment 1

The purpose of this homework is to introduce you to the basic image manipulation techniques.

Your program should be able to do the following:

1.   General modification
     a. You are to add all new processing to the image manipulation program provided and modified by hw0.
     b. Alternatively, you can implement the above by yourself.
     c. Utilize updated access to the parameter file containing the list of images, specification of the function to perform on each image, and set of parameters for each image.
2.   Processing of Grey-Level Images
     a. Implement square region of interest (ROI) selection by specifying pixel location (X, Y) of the left-top pixel of ROI and ROI size (S). Each operation should be performed in ROI and the combined image should be generated. Allow at least three ROIs per image. Allow overlapping ROIs but process each ROI independently. [1 point]
     b. Modify all provided and HW0 functions (except scaling) to operate only within specified ROIs. Allow different parameters for each ROI. [1 point]
3.   Augmentation of grey level images: generate 11 additional similar same-size images from each ROI via [4 points]
     a. Take the original ROI image and rotate 90, 180, and 270 degrees.
     b. Take the original ROI image and scale it up by (SC), $2 > SC > 1$, but keep the image size unchanged (starting from the upper left corner). Then rotate by 90,180, 270
     c. Take the original ROI image and change the brightness by (BR), 50>BR>0, then rotate 90/180/270.
4.   Augmentation of color images: generate 11 additional similar same-size images from each ROI via [4 points]
     a. Take the original ROI image and rotate 90, 180, and 270 degrees.
     b. Take the original ROI image and modify the color by multiplicative color brightness modification. Let value 2>More-C>1 be user-defined. Process each color channel: R1=R*More-C, G1=G*More-C, B1=B*More-C. Make sure (R1, G1, B1) are within allowable values, then rotate by 90,180, 270
     c. Take the original ROI image and modify the color by additive color brightness modification. Let value 50>AC>-50 be user-defined. Process each color channel: R1=R+AC, G1=G+AC, B1=B+AC. Make sure (R1, G1, B1) are within allowable values, then rotate by 90,180, 270

Write the report for this assignment.
     •   Create a "readme" file specifying the format of the parameter file and describe all parameters and all run options (include in the report).
     •   Give an example of the parameter file set to process several images with varying functions and parameters.
     •   Describe all operations and your implementation.
     •   Do include input and output example images for each function implemented (use several gray level and color images and at least two different parameters as appropriate, multiple ROIs, etc.)
     •   Utilize your cell phone or webcam to capture sample images suitable for testing your software
     •   Discuss results and performance of all operation

_____

How to submit

- Submit report and code on-line.
- See TA help desk for instruction on report and program submission and program testing.