CAP 4401 - IMAGE PROCESSING

Assignment 3

The purpose of this homework is to experiment with basic edge detection

Your program should be able to do the following:

- Edge Detection [6 points]
    - Add edge detection for grey level images to your choice of options. Use Prewitt operator (3x3) to compute dx and dy, compute gradient amplitude, compute edge direction
    - Your program should be able to threshold gradient amplitude given some threshold.
    - Your program should
        - operate within specified ROIs (up to three ROIs)
        - generate display of the amplitude of the gradient operator as intensity image
        - generate binary edge image derived from amplitude of the gradient operator by thresholding
        - generate binary edge image by further thresholding the above output using direction information (e.g. display only horizontal (+/- 10 degree) edges or 45 degree +/- 10 degree edges etc.)
    - Test your program on some grey level images
    - [Extra credit - 1 Point] Implement Prewitt (5x5) operator for directional derivatives computations, then compute edge amplitude and direction as before, compare results with Prewitt(3x3) mask
- Color processing [4 points]
    - Apply the edge detection to R,G,B components independently, then combine all three sets of edges into one image, experiment and discuss results
    - Add color edge detection by applying edge detector to the I-component (using RGB <> HSI conversion), display amplitude and thresholded magnitude (binarized) results.
    - Compare utilization of RGB vs HSI for color edge detection
    - [Extra credit - 1 point] Add color-edge detection by applying Prewitt edge detection to H and S component, display amplitude and thresholded magnitude (binarized) results.

Note one Prewit 5x5 mask (Dx), Dy is the transpose

-2	-1	0	1	2
-2	-1	0	1	2
-2	-1	0	1	2
-2	-1	0	1	2
-2	-1	0	1	2

Write a report for this assignment

- Include input and output images (use several gray level and several color images as appropriate).
- Discuss performance of grey level edge detectors on images
- Discuss performance of your edge detector on color images. Discuss performance in RGB and HSI domains. Support your conclusions by examples.
- Make sure that you have extensive report for this assignment (not just few comments).

How to submit

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