EEE-6512 Image Processing and Computer Vision
Fall 2018 Homework #6
November 10, 2018

Due: December 1, 2018, 11:59 PM EST

This assignment should be completed individually by the student. Late submissions will not be accepted. Proper citation should be provided for any references used.

Part I: Programming [100 points]

You are to write a function *circle_line_detect()* which accepts a grayscale image stored in a matrix as input and returns a pseudo-color image in which pixels that are part of lines as well as their 3x3 neighborhood are indicated as red and pixels that are parts of circles and their 3x3 neighborhood are indicated as green. All other pixels should have the same grayscale value as in the input image. To detect the circles and lines, you are to use the Hough Transform. You are not allowed to use built-in functions for the circle/line detection, but you may use built-in functions for any preprocessing that may be necessary.

You are to test your functions using img1.pgm, img2.pgm, and img3.pgm.

Part II Extra Credit [40 points]

Note: Completion of Part I is required to be awarded credit for the extra credit portion.

You are to write a function harris_corner_detect() which accepts a grayscale image stored in a matrix as input and returns a pseudo-color image in which pixels that are classified as corners by the Harris Corner detection method as well as pixels in the 3x3 neighborhood red. All other pixels should have the same grayscale value as in the input image. You are not allowed to use built-in functions for corner detection, but you may use built-in functions for any processing that may be necessary.

You are to test your functions using img1.pgm, img2.pgm, and img3.pgm.

You are to write a program *background_sub* which operates in the following manner:

- Convert the first 100 frames of *FroggerHighway.avi* to grayscale using one of the conversion methods discussed in the text.
- Using the converted frames, compute the average image.
- Display the average image.

- Choose any ten frames from the grayscale *FroggerHighway.avi* and display the thresholded result of performing background subtraction on the ten frames using the average image. (You are free to choose the threshold value.)

Your assignment write-up should include a detailed description of your programs/functions, input images, intermediate images, and output images.

To receive full credit for this assignment, you should submit the following files. 1.) Files containing the source code for your programs/functions 2.) A brief write-up which discusses the results of your programs/functions. Students should ensure that their M-files execute without warnings/errors to avoid receiving point deductions.