

EEE-6512 Image Processing and Computer Vision
Fall 2019 Homework #3
September 14, 2019

Due: September 28, 2019, 11:59 PM

This assignment should be completed individually by the student. Late submissions will not be accepted.

Part I Textbook Questions [50 points]

Answer the following questions from the textbook:

3.6, 3.34, 3.36, 3.48, and 3.55

Part II MATLAB Programming [50 points]

Please read the directions carefully. Solutions that do not follow the provided specifications will not receive credit.

1. Implement a function *myLaplacian()* which accepts a grayscale image which has been stored in a matrix and returns an image which has been sharpened using the Laplacian high-pass sharpening method. The Laplacian kernel used should detect edges in all eight directions.
2. Implement a function *myUnsharp()* which accepts the following:
 - a grayscale image which has been stored in a matrix
 - a scalar *k* which represents the amount of boost
 - a scalar *filt_size* which represents the size of the mean filter (a value of 3 indicates a 3x3 filter)

The function will return an image which has been sharpened using the high-boost method.

For both functions, you can use loops. However, you must code the spatial filtering operations (convolution and/or correlation) yourself. You are not allowed to use built-in MATLAB functions to perform these operations. You are to test your functions on any three grayscale images you choose.

For the programming portion, prepare a brief write-up describing your functions and their results. The write-up should include the display of the three images used for testing before sharpening and the output of the sharpening functions (nine images total).

Part III Extra Credit [5 – 10 points]

An additional five points for each function will be added to the grade if completed without the use of loops. To be eligible for extra credit, you must not receive any other point deductions for the programming portion of the assignment.

To receive full credit for this assignment, you should submit four files. 1.) A document containing answers to the textbook questions (.DOC, .DOCX, or PDF file) 2.) M-files containing commented MATLAB code for the functions *myLaplacian()* and *myUnsharp()* 3.) A brief write-up which discusses the results of *myLaplacian()* and *myUnsharp()*. Students should ensure that their M-files execute without warnings/errors to avoid receiving point deductions.