EEE-6512 Image Processing and Computer Vision
Fall 2018 Homework #4
September 28th, 2019

Due: October 12, 2019, 11:59 PM

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 Questions [40 points]

1. Compute the 2D Discrete Fourier Transform of the following grayscale image by hand (**show work to receive full credit**):

151	222	160	88
79	24	23	197
143	78	152	92
84	123	71	209

2. Multiply the image by $(-1)^{x+y}$ and repeat the computation.

3. How are the results related?

4. Answer question 7.25 from the text.

Part II MATLAB Programming [60 points]

1. The image interfere.pgm contains an interference pattern of unknown spatial frequency, orientation, and magnitude. However, it is a single frequency. Write a program that automatically finds and corrects it.

Notes:

The frequency that you are to eliminates is not the one that has the highest magnitude. It is the one "most out of place." You should not just zero the frequency. If you remove the frequency, the resulting image may be just as bad as the original.

2. Using the grayscale images provided in Homework #2, write a program that creates pseudocolor images composed of the eight colors [*red, blue, green, yellow, orange, purple, brown, black*] using the intensity slicing method. (**Only these colors should be used to receive full credit.**)

For the programming assignment, prepare a brief write-up describing your programs and results. Make sure to include copies of the output images and any intermediate images in your write-up.

Part III Extra Credit [20 points] (No partial credit)

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

Using the RGB, HSI, and one additional color space, write a program which segments the image scene.ppm. The output of your program should produce three pseudo-color images in which each color represents a region within the input image which contains pixels values with similar color values. You are free to use functions which perform the color space conversion but not the segmentation. Describe the segmentation methods used for each color space. Which of the color spaces seem to perform better in segmenting this image? What is your reasoning for this?

To receive full credit for this assignment, you should submit four files. 1.) A document containing answers to the written questions (.DOC, .DOCX, or PDF file) 2.) A file containing the source code for your programs/functions 3.) 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.