EE608 - Digital Image Processing

Assignment 4
Assigned Date: 15/03/2023
Due Date:31/03/2023

Problem 1: SSIM Index

1. Write a program to implement the SSIM index. Your program should also display the SSIM map. Generate test images by adding noise, blurring and compressing the reference image (all separately) (10)

Problem 2: Harris Corner Detection

1. Implement Harris Corner Detection Algorithm. (10)

Problem 3: Hough Transform

1. Implement Hough Transform to detect lines and circles using OPEN-CV. (5)

Problem 4: Binary Image Processing

1.Implement the connected components algorithm and use it to label the binarized version of I. Demonstrate your result using any of the gray scale images mentioned above. (5)
2. Implement minor blob removal to get rid of minor blobs. Demonstrate your result using the gray scale image you used in the previous question. (1)

Problem 5: Binary Morphology

1. Implement the following filters that accept a binary image I and window B as inputs: DI-LATE, ERODE, MEDIAN. Filter the above binary image using the following windows B = CROSS(5), B = SQUARE(3) (meaning the side of the square window is 3 pixels). Use the binary images generated in the previous assignment as input to this function. (3)
2. Verify that DILATE and ERODE operators are duals of each other with respect to complementation. Also verify that the MEDIAN operator is its own dual with respect to complementation. Show that the difference between the images from the direct and complement paths is indeed zero. (2)
3. Implement the compound operators OPEN and CLOSE using the basic filters implemented above. Use the same windows as in the previous problem. (2) 4. Finally, implement OPEN-CLOS and CLOS-OPEN. Filter the binary image using the same windows as above. (2)