Homework 02

Due: Tuesday March 19, at 11:59 pm

1. Perform logarithmic contrast compression on the image students.jpg. Display the histogram of both the original and the log compressed images. Compare the histograms. Next apply full scale contrast stretch to the logarithmic contrast compressed image and show the resulting image and its histogram. Do you observe any improvement in the quality of the image?

2. The probability density functionPr (r) for an image I is as follows:

Pr (0) is equal to 0, Pr (1) is equal to Pr (2) is equal to 0.1, Pr (3) is equal to 0.3, Pr (4) is equal to Pr (5) equal to 0, Pr (6) is equal to 0.4 and Pr (7) is equal 0.1.

The target histogram is given in the form Pz (z) as follows Pz (0) is equal to 0, Pz (1) is equal to 0.1, Pz (2) is equal to 0.2, Pz (3) is equal to 0.4, Pz (4) is equal to 0.2, Pz (5) is equal to 0.1, Pz (6) is equal to Pz (7) is equal to 0.

Perform histogram matching to transform the histogram of image I to the target histogram.

3. You have been provided with an image of coins ("hw2\_coins.tif"). Write a matlab script to threshold the image and produce a binary image. Once the image is segmented, count the number of coins, and generate a histogram showing the distribution (histogram) of coin size.

4. Label the following 8x8 binary picture using

4-connectivity

8-connectivity

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 |
| 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 |
| 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 |
| 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

5. Use your recently acquired knowledge in binary image processing, connected pixel region labeling, and logical operations to analyze the image provided ("hw2\_image.png"). Write a matlab script to determine the following:

What percentage of the pixels in the image are white?

What is the total number of objects?

What is the total number of holes?

What is the total number of objects with holes?