



Benha University

1st Term (January 2014) Final Exam

Class: 4th Year Students

Subject: Image Processing



Faculty of Computers & Informatics

Date: 9/1/2014

Time: 3 Hours

Examiner: Dr. Mazen Selim

Answer the following questions:

Question (1) Answer with true or false (10 Marks)

- a) An image with low contrast has wide histogram distribution
- b) The idea behind contrast stretching is to increase the dynamic range of the gray levels in the image being processed
- c) High-boost filtering gives us the flexibility to decrease the contribution made by the image to overall enhanced result.
- d) A Degradation is defined at points for which $H(u,v)$ is down to a certain fraction of its maximum value
- e) Convolution is the same as correlation expect that , the filter is first rotated by 180 degree
- f) Power-law function maps a narrow range of low gray-level values in the input image into a wider range of output levels.
- g) Single valued is required to guarantee the inverse transformation will exist
- h) Laplacian filter replaces the pixel value by the median value in the neighborhood
- i) The number of bits used to quantize the image is known as intensity reslution.
- j) When using the contraharmonic filter positive values of Q eliminates the pepper noise.

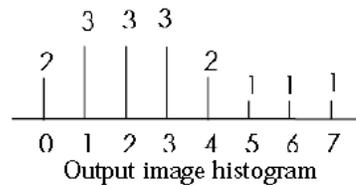
Question (2) (15 Marks) (6+7+2)

Suppose that you have been given the 3-bit 4x4 image shown in the figure(a) as below.

- A. Show the output image as a result of histogram equalization.
- B. Using the same image matrix as in the previous example, show the output image as the desired histogram as in fig. (b).
- C. Find the average(mean) intensity and the standard deviation using the pdf distribution

0	0	0	4
1	1	1	5
1	2	2	7
2	2	2	7

-a-



-b-

Question (3) (12 Marks) (3+6+3)

- a) Explain the types of noise in terms of their propability characterstics
- b) The image given below is a 3 X 3 image. What will the value of the center pixel change to when this image is passed through
 - a. Arithmetic mean filter
 - b. Geometric mean filter
 - c. Harmonic mean filter

1	7	5
6	2	3
1	4	2

- c) Explain how can we redue the effect of perodic noise in the frequency domain?

Question (4)

(16 Marks) (3+2+6+2+3)

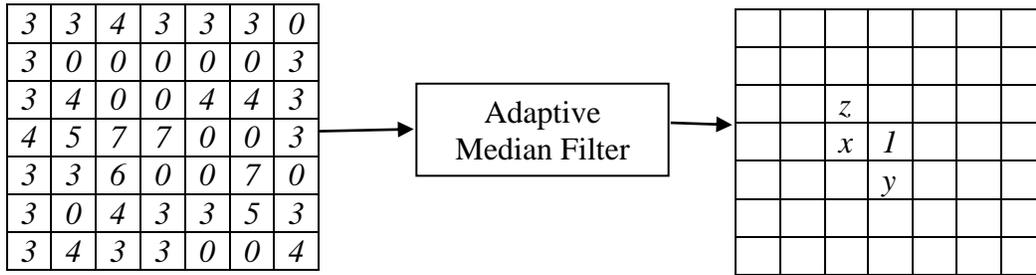
- a) Explain how to measure the image information?
- b) Consider the simple 4X8, 8-bit image:
 - a. Compute the entropy of the image:
 - b. Compress the image using Huffman coding
 - c. Compute the compression achieved and the effectiveness of the Huffman coding
 - d. Redistribute the image intensities according to 6 bits/gray

21	160	21	95	169	245	255	100
21	160	21	95	169	245	255	100
21	160	21	95	169	245	255	100
21	160	21	95	169	245	255	100

Question (5)

(12 Marks) (8+4)

- a) Given an input image of size 7 x 7 shown below, was filtered using 3 x 3 adaptive median filter with maximum allowed size of 5 x 5. What are the values of the pixels x, y, and z in the output image?



- b) Explain the types of data redundancies, give an examples?

