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IT & SE Department (Level 5) Subject: (Digital Image Processing) Lecturer: Dr.Mogeeb A. A. Mosleh

Duration: 2.5 h Academic Session: 2017/2018 Mid-Term Exam Answer ALL questions (2 pages) (100 marks). Ouestion 1 (30 marks). Multiple choices (circle the most appropriate one): ←1) Dilation-Morphological image operation technique is used to a) shrink brighter areas of the image b) diminishes intensity variation over the image expands brighter areas of the image d) scales pixel intensity uniformly Image compression is. b) sharpening the intensity-transition regions a) making image look better c) minimizing degradation over image d) reducing the redundancy of the image data 3) The dominant application of imaging in the microwave band is. c) communication d) None a) Radar b) satellite 4) What's recognition? a) It's the process that assigns a label to an object based on its descriptors. d) None b) it's process of search a image c) a & b 5) Frequency domain refers a) its processing techniques are based on modifying the Fourier transform of an image. b) its processing techniques are based on modifying the laplace transform of an image. d) None c) a & b 6) Basic steps for filtering in the frequency domain d) all of these c) Inverse Fourier transform a) Fourier transform b) filter function 7) Advantage ofis finding the brightest points in an image. d) none of above c) median filter a) max filter b), min filter 8) Advantage of is finding the darkest points in an image. d) none of above a) max filter b) min filter c) median filter 9) Color printer works by using a) cyan, magenta, Yellow and black dynes b) red, magenta, Yellow and black dynes c) cyan, blue, Yellow and black dynes d) none of above (10) An image of size 1024 × 1024 pixels in which the intensity of each pixel is an 8 bit quantity requires the storage space (if not compressed) (b) 1 MB a) 1 KB h d) 2 MB c) 2 KB

Question 2 (30 marks). \(
\begin{align*}
\text{Suppose that you have been given the 3-bit 8x8 image shown in figure below. For the given image perform the following operations:

Negation Thresholding with T=4

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c) Intensity level slicing with background with r1 = 2 and r2= 5

D Plot the image histogram, and find probability density function (PDF)?

(e) Perform Histogram equalization and then plot the equalized histogram

Find the output image g(x,y) using Power Law Transformation $g(x,y) = [f(x,y)]^2$, note that Power Law Transformation s = r where r and s are normalized input and output image pixel values.

15	L-r-1
1	L-1-r
3	. 10

0	5	7	7	5	8	7	8
7	2	6	2	6	5	6	8
6	9	7	7	0	7	-2	7
6	6	1	7	6	1	7	5
9	6	0	7	8	2	6	7
2	8	8	2	7	5	7	8
7	3	2	6	1	7	5	8
9	9	5	6	7	7	7	7

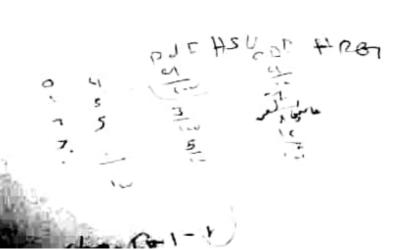
Question 3 (40 marks).

A) Define the following terms:

Image, Brightness, gray level, hue of saturation, resolution, pixel, recognition, sampling and quantization. Luminance, contrast stretching, grey level slicing, image subtraction, histogram. Image Restoration, and segmentation?

- B) What is the amount of memory required to store a RGB image with size W x H? Assuming each color channel uses 8 bits for storage and there is no compression of image?
- (C) What are the difference between HSI (HSV) color channels and RGB color channels? Why do we need different color channel representation?
- D) What is Nyquist sampling rate? How does it affect image resolution?
 - E) Discuss Dilation and Erosion process, and why it used for?
 - F) Describe the segmentation process, benefits, segmentation algorithm and methods?

Best of Luck



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Academic Session: 2017/2016 Final Exam



SE & IT Department (Level 5) Subject: (Digital Image Processing) Lecturer: Dr. Mogsets A. A. Moslets

Date: 26-2-2018 Duretion: 4 h

Answ	W ALL questions (3pages) (100 marks).
Ques	tion 1 (30 marks)
Multi	ple choices (circle the most appropriate one):
1)	vynich of the following is a recentor in the retire of themes
2)	a) Rods b) Cones c) Rods and Cones d) Neither Rods nor Cones What is the function of Ins?
	a) Source of nutrition (b) Detect color (c) Varies focal length (d) Control amount of light
3)	Ratio of number of rods to the number of cones is
	" " " " " " " " " "
4)	I wo regions are said to be
51	a) Adjacent b) Disjoint c) Closed d) None of the Mentioned
	Catted no
	Boundary b) Border c) Contour of All of the Mentioned What are the basic quantities that are used to describe the quality of a chromatic light source?
	a) Radiance brightness
	a) Radiance brightness and wavelength b) Brightness and luminance b) Brightness and luminance
7)	c) Radiance brightness and luminance d) Luminance and radiance What is the quantity that is vised to make
	from the light source?
	a) Brightness by interest, all the
8)	The street of the contract of
	those are useful in the representation and descention image components.

- a) Segmentation b) Representation & description c) Compression d) Morphological processing 9) To convert a continuous sensed data into Digital form, which of the following is
 - a) Sampling b) Quantization c) Both Sampling and Quantization

those are useful in the representation and description of shape?

- d) Neither Sampling nor Quantization
- 10) To convert a continuous image f(x, y) to digital form, we have to sample the
- a) Coordinates b) Amplitude' c) All of the mentioned d) None of the mentioned 11)The transition between continuous values of the image function and its digital
- a) Quantization b) Sampling c) Restoration d) None of the Mentioned
- 12) What is the tool used in tasks such as zooming, shrinking, rotating, etc.?
- a) Sampling b) Interpolation c) Fifters d) None of the Mentioned 13) The difference in intensity between the highest and the lowest intensity levels in
 - a) Noise b) Saturation c) Contrast d) Brightness

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14) In a dark image, the components of histogram are concentrated on which the grey scale?	side of
a) High b) Medium of Low of Events distributed	
image we notice that the components of histogram are concer	itrated
on the low side on intensity scale.	
a) bright b) dark c) colorful d) All of the Mentioned 16) Histogram Equalization is mainly used for	
a) Image enhancement b) Blurring c) Contrast adjustment d) None of the Mentioned	e
17) Two images having one pixel gray value 01010100 and 00000101 at the	same
location, are operated against AND operator. What would be the resultant	pixel
gray value at that location in the enhanced image?	
a) 10100100 b) 11111011 c) 00000100 d) 01010101	
18) What does the total number of pixels in the region defines?	
a) Perimeter b) Area c) Intensity d) Brightness	
19) The two steps: one is the creation of new pixel locations, and other is the	e
assignment of gray levels to those new locations are involved in	
 a) Shrinking b) Zooming c) All of the mentioned d) None of the mentioned 	
Images quantized with insufficient brightness levels will lead to the occ	urrence of

a) Pixilation b) Blurring c) False Contours d) None of the Mentioned

Question 2 (30 marks).

Given following 8x8 image which is having 16 grey tevels as shown in figure below. For the given image perform the following operations:

- i. Negation
- Thresholding with T = 5
- iii. Intensity level slicing with background with r1=2 and r2= 5
- iv. Plot the image histogram, and find probability density function (PDF)?
- Perform Histogram equalization and then plot the equalized histogram
- vi. Find the output image g(x,y) using Power Law Transformation $g(x,y) = [f(x,y)]^2$
- vii. Perform Zooming on the following Image by Replication and Linear Interpolation

8	8	10	7	9	9	8	7_
9	7	10	9	8	9	7	9
10	9	7	7.	10	10	10	7
7	9	10	9	10	8	7	8
10	10	8	8	9	9.	7	9
- 8	8	8	8	10	9	9	9
7	7	9	7	8	7	10	10
.9	9	9	10	9	7.	10	. 7

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IT & SE Department (Level 5) Subject: (Digital Image Processing) Lecturer: Dr.Mogeeb A. A. Mosleh

c) Intensity level slicing with background with r1 = 2 and r2= 5

D Plot the image histogram, and find probability density function (PDF)?

(e) Perform Histogram equalization and then plot the equalized histogram

Find the output image g(x,y) using Power Law Transformation $g(x,y) = [f(x,y)]^2$, note that Power Law Transformation s = r where r and s are normalized input and output image pixel values.

15	L-r-1
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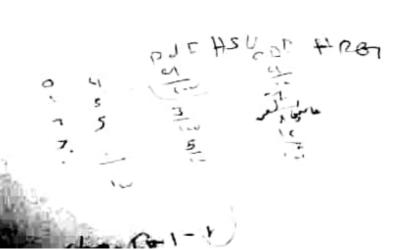
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Question 3 (40 marks).

Answer all the following Questions:

- How can you sharpen an image, reduce its noise, and detect the edges?
- ii. Is there any relation between edge detection and sharpening? Discuss!
- iii. Describe histogram equalization and histogram matching as a tool for image enhancement. Can these tools be used for other important applications? Explain!
- Design 3x3 filters that can be used for detecting diagonal lines.
- V. Write the expression to find the number of bits to store a digital image? And Find the number of bits required to store a 256 X 256 image with 32 gray levels?
- vi. Define the following terms:

 Image -- Brightness Gray level -- Resolutions illumination and reflectancesampling and quantization.- contrast stretching grey level slicing -- masking -histogram equalization -- Image Negatives -- Median filter -- Noise probability
 density function -- Hue of saturation -- segmentation -- Image Restoration?
- vii. Explain the basic relationships between pixels?
- viii. What are the advantages of Median filter?
- ix. What is meant by Image Restoration? And what are the three methods of estimating the degradation function?
- x. In your opinion, what is the most interesting topic of this course? Explain how important this topic is in the context of image processing, and how important it is for your studies/job?

Best of Luck