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Vellore Institute of Technology

Continuous Assessment Test I – January 2023

Programme	:	**B. Tech. CSE**	Semester	:	**WIN 2022 - 23**
Course	:	**Image Processing**	Code	:	**CSE 4019**
			Class Nbr	:	CH2022235000626
Faculty	:	**R. Jagadeesh Kannan**	Slot(s)	:	**E2+TE2**
Time	:	**90 Min**	Max. Marks	:	**50**

Answer ALL the Questions

Q.No.	Sub. Sec.	Question Description	Marks
1.		i) Equalize the histogram in the following 8x8 image by giving the pixels values of 0, 1, 2, and 3. Make any assumptions you have explicit. (8 Marks)	[13]

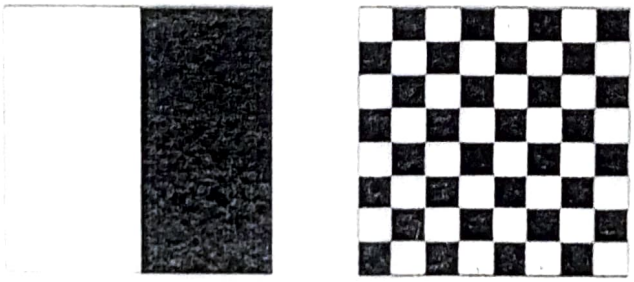
0	3	3	1	3	3	0	0
1	1	1	1	1	1	1	1
2	2	2	2	2	2	3	3
2	2	2	2	2	2	3	3
1	1	1	2	2	2	2	3
1	1	1	2	2	3	2	3
2	2	2	2	3	3	3	3
2	2	2	3	3	3	3	3

ii) Take a look at a histogram-equalized digital image. Discuss what happens if you equalize this image once more. (5 Marks)

2. Despite being very different from one another, the two images in Figure below share the same histogram. Both images are 8 x 8 pixels in size and have black and white pixels. Let's say that a 3 x 3 smoothing mask is used to blur both images. [12]

i) Would the final histograms remain unchanged? (6 Marks)

ii) Sketch roughly the two histograms, then describe your solution. (6 Marks)



3. The manufacturing division of a mobile manufacturing company wants to automate the process of placing components for the mobiles according to colour. The mobiles come in a variety of hues, including red, blue, green, and white. The automated process must identify the mobile device based on colour and place it in the proper spot. Consider a cost-effective imaging model as a company employee when [12]

recommending one to select the appropriate mobiles for placement. [7 Marks]

In order to process a colour image with a size of 512*512, a multimedia company must calculate the number of bits needed. The image's grayscale ranges between 0 and 511. [5 Marks]

4. To create an image processing application, the following images are sent to a multimedia research organization [13]

0	64	64	256
0	128	128	64
0	128	128	64
0	64	64	256

Image 1

0	32	128	256
0	128	128	128
0	128	128	128
0	32	128	256

Image 2

Perform the operations on these images assuming they have values between 0 and 255. [6 Marks]

Logical AND
Arithmetic OR
Bitwise XOR

When given an image segment and a set of intensity values V={3,4,5}, compute the 4-path, 8-path, and m-path between a and b.

If a specific path doesn't exist, then justify it with the proper justifications. [7 Marks]

5	6	3	4	1
2	3	2	6	4 (b)
4	4	5	3	6
(a) 5	2	6	4	3
3	4	2	5	6

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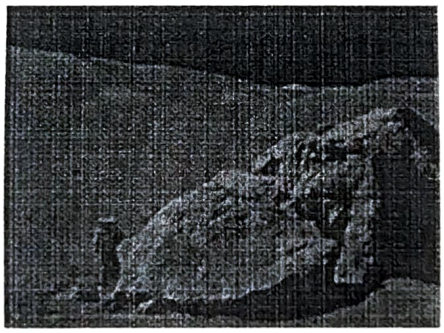
Continuous Assessment Test II – March 2023

Programme	:	**B. Tech. CSE**	Semester	:	**WIN 2022 - 23**
Course	:	**Image Processing**	Code	:	**CSE 4019**
			Class Nbr	:	**CH2022235000626**
Faculty	:	**R. Jagadeesh Kannan**	Slot(s)	:	**E2+TE2**
Time	:	**90 Min**	Max. Marks	:	**50**

Answer ALL the Questions

Q.No.	Sub. Sec.	Question Description	Marks
1.		Distinguish between the affine and perspective transformations [4M]. Demonstrate how to map an object from one space to another using surface-based methods and an algorithm [6M].	[10]
2.		Your employer assigned you to the data transmission department for entertainment. Customers complained that the movies they were watching were of poor quality and that the data was visually degraded. The company requested that you submit a report detailing the causes of the visual quality degradation. The following examples of the movie data are provided:  Determine the cause and type of degradation [2M] Determine the type of filter used to reduce degradation [2M]. Recommend methods for improving quality[2M] Whether applying frequency domain processing will lessen the degradation. Justify your answer. [4M]	[10]
3.		The national Aadhar card's QR code will include biometric data, according to the central government agency. They have taken pictures of people's eyes and want to use the iris as a biometric as well. The agency now considers iris extraction to be somewhat complex and requests your suggestions for extraction. Help them by supplying a method for iris extraction from eye images and outlining the procedure's specific steps and benefits and drawbacks.	[10]
4.		Examine how morphological image processing is used in pattern recognition and object recognition.	[10]
5.		Describe the upcoming developments and potential uses for image registration in various industries.	[10]

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Reg. No. :

Final Assessment Test (FAT) - APRIL/MAY 2023

Programme	**B.Tech**	Semester	**Winter Semester 2022-23**
Course Title	**IMAGE PROCESSING**	Course Code	**CSE4019**
Faculty Name	**Prof. Jagadeesh Kannan R**	Slot	**E2+TE2**
		Class Nbr	**CH2022235000626**
Time	**3 Hours**	Max. Marks	**100**

Part A (10 X 10 Marks)
Answer All questions

01. (i)A 6-bit quantized digital grey-scale image of size 2400 * 2200 is being transmitted through a channel over a bandwidth of 2 Mbps. The transmission time for the following scenarios should be determined: a) For the given grey-scale image. b) For a 24-bit quantized color image. (ii) Two pixels, "p" and "q." are located at (11, 23) and (35, 57), respectively, in the X and Y directions. Calculate c) Euclidean distance between p and q. d) City-Block Length between p and q e) Checker Board distance between p and q **[10]**

02. A 3-bit image of size 4×5 is shown below. Compute the histogram equalized image. **[10]**

0	1	1	3	4
7	2	5	5	7
6	3	2	1	1
1	4	4	2	1

03. Let f(x, y) = 2*x*y+ (x-y) in an image, where x, y = 0,1,2,3. Perform the following operations: (i)The DFT of the f(x, y). (ii) The Haar transform for the real values of Fourier coefficients (iii) Inverse Haar transform for Haar coefficients (iv) The IDFT on the inverse Haar transform coefficients (v) PSNR between the f and inverse Fourier coefficients. Discuss the observations you have noticed during the process. **[10]**

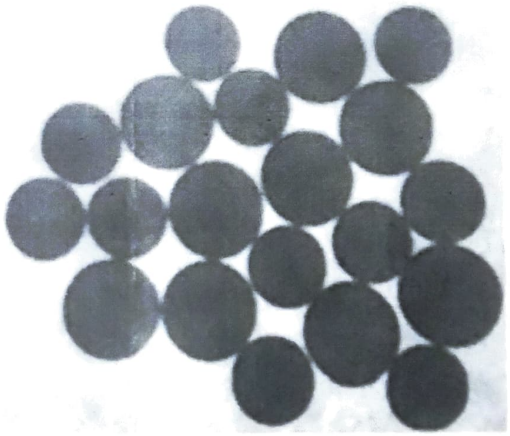
04. Discuss the differences, relative benefits and drawbacks of (i) Spatial domain filtering (ii) Frequency domain filtering **[10]**

05. Give a detailed explanation of the procedures involved in running PCA on an image dataset = { 2, 3, 4, 5, 6, 7 ; 1, 5, 3, 6, 7, 8 }. Compute the principal component using PCA Algorithm including how to calculate the covariance matrix, eigenvectors, and eigenvalues. **[10]**

06. Below is a binary representation of a coin-filled scene with some overlap. Give a solution that uses morphological and logical operations to address each question. **[10]**

i) Create a method to determine how many coins are shown in the above image based on morphology and connected components.

ii) To count the boundary pixels in the aforementioned image, create a method based on morphology and logic.



07. An image's texture can be examined in various directions using the gray-level co-occurrence matrix (GLCM). Also, list down the other possible statistical descriptors for GLCM. **[10]**

0	0	0	1	2
1	1	0	1	1
2	2	1	0	0
1	1	0	2	0
0	0	1	0	1

08. State the idea of using texture analysis to extract features. How does texture analysis function and what is it? Describe a sample image that can be used to demonstrate texture analysis. **[10]**

09. Compare JPEG compression to other image compressions methods like PNG, TIFF, and GIF, and discuss its benefits and drawbacks. What circumstances make JPEG the best option for image compression? **[10]**

10. Compare and contrast the trade-offs involved in selecting a compression algorithm based on various compression efficiency metrics. What aspects need to be taken into account when selecting an algorithm for a specific application? **[10]**