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10EC763

Seventh Semester B.E. Degree Examination, Jan./Feb. 2021
Image Processing

Time: 3 hrs.   Max. Marks:100

Note: *Answer any FIVE full questions, selecting atleast TWO questions from each part.*

PART - A

1   a. Explain the components of a general purpose image processing system, with block diagram.
(08 Marks)

b. Describe Brightness adaptation and Weber ratio as applicable to Image processing.
(06 Marks)

c. Explain the Image formation in the eye with example.   **(06 Marks)**

2   a. Discuss Image Acquisition using Multi sensor array system.   **(06 Marks)**

b. Describe the process of image sampling and quantization in the Digital Image Processing.
(06 Marks)

c. Let V = {0, 1} and compute the D_4 and D_8 distance between p and q for the image segment. Indicate the shortest distance path.

2	1	0	1	q
0	0	2	0	
1	0	1	1	
P	1	2	1	0

(08 Marks)

3   a. Discuss the properties of 2 – D unitary transforms.   **(08 Marks)**

b. For the given orthogonal matrix A and image U, obtain the transformed image V.

$$A = \frac{1}{\sqrt{2}}\begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix} \quad U = \begin{bmatrix} 6 & 3 \\ 12 & 1 \end{bmatrix}.$$
(06 Marks)

c. Define two dimensional unitary DFT check whether unitary DFT matrix is unitary or not for N = 4.   **(06 Marks)**

4   a. Explain Haar transform with its properties. Construct Haar transform matrix for n = 2 and compute the Haar transformation for 2 × 2 image shown below :

$$\begin{bmatrix} 3 & -1 \\ 6 & 2 \end{bmatrix}.$$
(12 Marks)

b. Define Hadmard transformation and generation Hadmard matrix Hn for n = 3 from the core matrix

$$H_1 = \frac{1}{\sqrt{2}}\begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix}.$$
(08 Marks)

PART - B

5   a. Discuss the following enhancement operation to enhance the image :
i) Negative of image   ii) contract stretching   iii) Log transformation.   **(09 Marks)**

b. Perform histogram equalization for the 32 ×32 image and its histogram is shown in table.

Gray level	0	1	2	3	4	5	6	7
No. of pixels	100	250	450	85	40	40	34	25

(11 Marks)

10EC763

6 a. Describe the Laplacian filter to sharpen the images. **(06 Marks)**
   b. Discuss in detail the basic steps for enhancing images in frequency domain, with block diagram. **(06 Marks)**
   c. Explain different types of Low – pass filter in frequency domain. **(08 Marks)**

7 a. Describe the model of image degradation process. **(04 Marks)**
   b. With probability density function, explain any three noises. **(06 Marks)**
   c. What is the importance of adaptive filters in image restoration? Explain the adaptive median filter with example. **(10 Marks)**

8 a. Explain the intensity slicing and gray level colour transformation as applied to pseudo colour image processing. **(10 Marks)**
   b. Describe the conversion of RGB colour model into HIS colour model and HIS to RGB. **(10 Marks)**

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