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10TE754

Seventh Semester B.E. Degree Examination, Dec.2019/Jan.2020

Image Processing

Time: 3 hrs.

Max. Marks:100

Note: Answer FIVE full questions, selecting at least TWO questions from each part.

PART - A

- 1 a. Explain the components of a general purpose image processing system with a neat block diagram. (08 Marks)
b. Describe the formation of image in an human eye with a neat sketch and illustration. (08 Marks)
c. List the applications of image processing. (04 Marks)
- 2 a. Explain the image acquisition with sensor arrays. (08 Marks)
b. Define image sampling and quantization. Explain the basic concepts with an example. (08 Marks)
c. How many minutes would it take to transmit a 1024×1024 image with 256 gray levels using 56K band modem. Assume, a packet consists of one start and one stop bit. (04 Marks)
- 3 a. Calculate the transformed image V and basis images.
$$A = \frac{1}{\sqrt{2}} \begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix} \quad V = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$$
 (06 Marks)
b. List the properties of unitary transforms and explain any 2 properties. (06 Marks)
c. List the properties of 2D -DFT and prove any 2 properties. (08 Marks)
- 4 a. Define discrete sine transform. List any 5 properties. (06 Marks)
b. Develop Hadamard transform for $n = 3$. Write 4 properties. (08 Marks)
c. Construct Haar transform matrix for $n = 2$. (06 Marks)

PART - B

- 5 a. Define "Image Enhancement". Explain basic gray level transformations in spatial domain. (08 Marks)
b. For the given 4×4 image having gray scale between $[0 -9]$ get histogram equalized image. Draw the histogram of image before and after equalization.

3	6	6	3
8	3	8	6
6	3	6	9
3	8	3	8

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(06 Marks)
c. Explain image subtraction and image averaging operations with examples. (06 Marks)
- 6 a. Explain the basic steps for filtering in the frequency domain. Mention its advantages. (06 Marks)
b. Explain sharpening of images in frequency domain using : i) ideal high pass filter ii) Butterworth high pass filter. (08 Marks)
c. Explain homomorphic filtering approach with a neat block diagram. (06 Marks)

- 7 a. Explain inverse filtering approach and its limitations in image restoration. (06 Marks)
b. List the various noise probability density functions along with mathematical expressions and graphs. (08 Marks)
c. Discuss the importance of adaptive median filter and highlight the working of adaptive median filters in image restoration. (06 Marks)
- 8 a. Develop a scheme for converting colors from : i) RGB to HIS ii) HIS to RGB. (10 Marks)
b. Explain the following pseudo image processing techniques. I) intensity slicing ii) graylevel to color transformations and their applications. (10 Marks)

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