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06EC756

Seventh Semester B.E. Degree Examination, January 2013
Image Processing

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. What is digital image processing? Explain the use of DIP in any two applications. **(06 Marks)**

b. What are the fundamental steps in DIP? Explain the working of each stage, with block diagram. **(10 Marks)**

c. Write a short note on brightness adoption and discrimination. **(04 Marks)**

2 a. Explain the adjacency, connectivity, regions and boundaries between pixels, with examples. **(08 Marks)**

b. Let V = {1, 2} and compute the D4 and D8 distances between p and q for the image segment. Indicate the shortest path with double line. **(08 Marks)**

	3	1	2	1	(q)
	2	2	0	2	
	1	2	1	1	
(p)	1	0	1	2	

c. Develop an algorithm for converting a one – pixel thick, 8 connected path to a 4 connected path. **(04 Marks)**

3 a. Explain the properties of unitary transforms and give 4 important unitary image transforms. **(08 Marks)**

b. Calculate the transformed image V and the basis images for orthogonal matrix A and image U

$$A = \frac{1}{\sqrt{2}}\begin{pmatrix} 1 & 1 \\ 1 & -1 \end{pmatrix},\ U = \begin{pmatrix} 2 & 3 \\ 1 & 2 \end{pmatrix}.$$ **(06 Marks)**

c. Discuss the properties of 2 dimensional DFT. **(06 Marks)**

4 a. Explain Haar transformation with its properties, compute the Haar transformation of 2 × 2 image $F = \begin{bmatrix} 3 & -1 \\ 6 & 2 \end{bmatrix}$. **(08 Marks)**

b. Define Hadmard transform, and generate Kernel for N = 4. **(06 Marks)**

c. Discuss the advantages and applications of the following transformations
i) Cosine ii) Sine iii) Slant iv) KL. **(06 Marks)**

PART – B

5 a. Explain the image enhancement in spatial domain with log transformation and bit plane slicing techniques. **(06 Marks)**

b. Derive the equation for histogram equalization and mention its satisfied conditions. **(08 Marks)**

c. Explain the use of arithmetic and logical operations for image enhancement. **(06 Marks)**

6 a. Explain the different types of low – pass spatial filters. **(08 Marks)**

b. Explain the homomorphic filters for image enhancement. **(06 Marks)**

c. What is the purpose of image restoration? Explain the image degradation and restoration, with suitable model. **(06 Marks)**

7 a. Explain any 4 noise probability density functions. **(08 Marks)**

b. What are the different types of mean filters used for noise. Reduction and explain in brief. **(06 Marks)**

c. Explain the use of inverse filtering and minimum mean square error (wiener) filtering for handling noise. **(06 Marks)**

8 a. Convert the RGB colour model into HSI color model. **(08 Marks)**

b. Explain the pseudo color image processing and draw the intensity slicing curve for gray levels to 4 colours. **(06 Marks)**

c. List three main properties of a median filter. **(03 Marks)**

d. How many minute would it take to transmit a 1024 × 1024 image with 256 gray levels, using 56 kbps modem? **(03 Marks)**

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