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Seventh Semester B.E. Degree Examination, Dec.2014/Jan.2015

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. With the help of a neat block diagram, explain the components of a general purpose image processing system. (10 Marks)
- b. Explain the importance of brightness adaption and discrimination in image processing. (06 Marks)
- c. Mention the applications of image processing. (04 Marks)
- 2 a. How many minutes would it take to transmit a 512×512 image with 256 grey levels at 300 baud rate? (Baud rate is the number of bits transmitted per second. Assume each byte is one packet with a start bit and stop bit). (04 Marks)
- b. Explain the process of image acquisition by sensor strips and sensor arrays. (10 Marks)
- c. Consider the image segment given in Fig.Q2(c). Let $V = \{2, 3, 4\}$, compute the lengths of the shortest 4, 8 and m path between 'P' and 'Q'. If path does not exists, explain why.

3	4	1	2	0
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0	1	0	4	2 (q)
2	2	3	1	4

(p) 3	0	4	2	1
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1	2	0	3	4
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Fig.Q2(c)

- 3 a. Explain any four properties of two dimensional Fourier transforms. (08 Marks)
- b. What are basis vectors? (04 Marks)
- c. For the given orthogonal matrix A and image u, obtain the transformed image and basis images. (08 Marks)

$$A = \frac{1}{\sqrt{2}} \begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix}$$

$$u = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$$

- 4 a. Define discrete sine transfer and its inverse transformation. Discuss any three properties of discrete sine transformation. (10 Marks)
- b. Develop Haar transform for $n = 2$. Discuss the properties of Haar transform. (10 Marks)

PART – B

- 5 a. Explain the following with applications:
 - i) Contrast stretching
 - ii) Bit plane slicing
 - iii) Grey level slicing
 - iv) AND operation

(10 Marks)

- b. For the given 4×4 image having grey scales between $[0, 9]$, perform histogram equalization and draw the histogram of image before and after equalization.

$$\begin{bmatrix} 2 & 3 & 3 & 2 \\ 4 & 2 & 4 & 3 \\ 3 & 2 & 3 & 5 \\ 2 & 4 & 2 & 4 \end{bmatrix}$$

(10 Marks)

- 6 a. Explain the basic concept of spatial filtering in image enhancement and hence explain importance of smoothing filters and median filters. (10 Marks)
- b. Explain homomorphic filters in image enhancement with neat block diagram. (10 Marks)
- 7 a. Define the process of image restoration. Explain any four important noise probability density functions. (10 Marks)
- b. Explain Weiner filtering and inverse filtering in image processing. (10 Marks)
- 8 a. Explain HSI color model and conversion from HSI to RGB colors. (10 Marks)
- b. What is pseudo color image processing? Explain grey level to color transformations. (10 Marks)

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