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10EC763

Seventh Semester B.E. Degree Examination, Dec.2016/Jan.2017
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. With a neat block diagram, explain the fundamental steps in image processing. **(10 Marks)**

b. Explain the principle of image acquisition using a single sensor with neat diagram. **(06 Marks)**

c. List four applications of image processing. **(04 Marks)**

2 a. Explain the concept of sampling and quantization in image processing with example. **(08 Marks)**

b. Consider the image segment shown :

i) Let V = {0, 1} and compute the lengths of shortest 4 –, 8 – and m-path between p and q If a particular path does not exist between these two points explain why.

ii) Repeat for v = {1, 2}

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

(10 Marks)

c. Define spatial and gray level resolution. **(02 Marks)**

3 a. An image U and information matrix A are given by :

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

Obtain the transformed image V. compare the energy in U and V and give inference. **(06 Marks)**

b. Explain the following properties of unitary transform :
i) Energy conservation ii) decorrelation. **(06 Marks)**

c. Show that the cosine transform of a vector of N elements can be calculated in $O(N \log_2 N)$ operation via N – point FFT. **(08 Marks)**

4 a. Using the core matrix H_1 generate hadamard transform matrix H_3 and explain 4 properties of hadamard transform. **(08 Marks)**

b. Obtain the Harr transform matrix for N = 4. **(08 Marks)**

c. State the four properties of slant retransform. **(04 Marks)**

PART – B

5 a. Explain the power law transformation and piece-wise linear contrast stretching with a neat graphical illustration. **(10 Marks)**

b. Explain the importance of image enhancement in image processing. Explain in brief any two point processing techniques implemented in image processing. **(10 Marks)**

6 a. Explain image subtraction and image averaging operations with examples. **(10 Marks)**

b. Explain the smoothing of images in frequency domain using :
i) Ideal lowpass filer ii) Butterworth lowpass filter. **(10 Marks)**

7 a. Write an explanatory note on the following noise models :
   i) Erlang noise
   ii) Raleigh noise
   iii) Impulse (salt and pepper) noise
   iv) Uniform noise. **(06 Marks)**

   b. Explain band reject filter used in the periodic noise reduction in frequency domain. **(06 Marks)**

   c. Derive an expression of the linear degradation model in presence of additive noise. **(08 Marks)**

8 a. Briefly explain any two color model used in color image processing. **(06 Marks)**

   b. Develop a procedure for converting :
   i) RGB to HSI model
   ii) HSI to RGB model. **(06 Marks)**

   b. Write a note on pseudo color image processing. **(08 Marks)**

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