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17CS753

Seventh Semester B.E. Degree Examination, June/July 2024 Digital Image Processing

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. With a neat block diagram, explain steps in image processing system. (12 Marks)
 b. Explain image sampling and quantization. Give example. (08 Marks)

OR

- 2 a. Explain the following terms with example :
 i) Neighbours
 ii) Euclidean distance
 iii) Adjacency
 iv) Connectivity of pixels. (10 Marks)
 b. Let $v = \{0, 1\}$ and compute the length of the shortest 4, 8 and m path between p and q. If a particular path does not exist between these two points explain why?

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

(10 Marks)

Module-2

- 3 a. Perform the Histogram Equalization of the following image:

$$f(x,y) =$$

1	2	3	4
5	5	6	6
6	7	6	6
6	7	2	3

(10 Marks)

- b. Apply Histogram specification to the 8×8 , Eight level image given below:

Pixel Distribution of the image

P_K	8	10	10	2	12	16	4	2
Y_K	0	1	2	3	4	5	6	7

The target Histogram is as below:

Y_K	0	1	2	3	4	5	6	7
P_K	0	0	0	0	20	20	16	8

(10 Marks)

OR

- 4 a. Write note on :
 (i) Bit-plane slicing.
 (ii) Power law transformations.
 (iii) Log Transformations. (08 Marks)
 b. How do you characterize the spatial filters? (04 Marks)
 c. Explain the spatial filters that are used for image sharpening. (08 Marks)

Module-3

- 5 a. Explain the steps involved in filtering in frequency domain. (10 Marks)
 b. Distinguish between spatial domain and frequency domain enhancement technique. (10 Marks)

OR

- 6 a. Explain about ideal lowpass filter in frequency domain. (12 Marks)
 b. Explain any four properties of 2-dimensional Fourier transform. (08 Marks)

Module-4

- 7 a. Write the formal definition of image segmentation. (06 Marks)
 b. What is an edge? Explain the edges normally encountered in image processing. Why it is important? (08 Marks)
 c. Explain the three types of Grey level discontinuities in image processing. (06 Marks)

OR

- 8 a. Explain various Gradient operators used for edge detection. (12 Marks)
 b. Discuss the following:
 (i) Marr-Hildrith operator.
 (ii) Canny Edge detector. (08 Marks)

Module-5

- 9 a. Code the following message using arithmetic coding algorithm. "SWISS" (10 Marks)
 b. Code the message "ABBABAS" using LZW and encode the same. (10 Marks)

OR

- 10 a. Construct arithmetic coding for the string CBAC using the following table :

Symbol	A	B	C
Probability	0.3	0.3	0.4

(10 Marks)

- b. Compress the following 8 bit image using Huffman coding.

21	21	21	95	169	243	243	243
21	21	21	95	169	243	243	243
21	21	21	95	169	243	243	243
21	21	21	95	169	243	243	243

(10 Marks)

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