CBCS SCHEME

17CS753

Seventh Semester B.E. Degree Examination, June/July 2023
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. Explain fundamental steps in digital image processing with neat diagram. **(10 Marks)**
   b. Explain the concept of sampling and quantization of an image. Explain the data structure of representing digital images. **(10 Marks)**

OR

2 a. Explain any 4 applications of digital image processing with examples. **(10 Marks)**
   b. Consider the two images subsets S_1 and S_2 as shown in Fig.Q.2(b), for $V = \{1\}$. Determine whether these two subsets are i) 4 – adjacent   ii) 8 – adjacent   iii) m – adjacent.

S_1				S_2			
0	0	0	0	0	0	1	1
0	0	1	0	0	1	0	0
0	0	1	0	1(q)	1	0	0
0	1	1	1(p)	0	0	0	0

Fig.Q.2(b)

(10 Marks)

Module-2

3 a. With necessary graph, explain the following spatial image enhancement operations:
   i)   Image negative
   ii) Power-law transformation
   iii) Contrast stretching
   iv) Grey-level slicing. **(10 Marks)**
   b. Define histogram. Apply histogram specification and matching for the following 8×8 image data.

Gray levels	0	1	2	3	4	5	6	7
Number of pixels	8	10	10	2	12	16	4	2

Target Histogram

Gray levels	0	1	2	3	4	5	6	7
Number of pixels	0	0	0	0	20	20	16	8

(10 Marks)

OR

4 a. Define image enhancement. Explain how arithmetic operators are helpful in image enhancement. **(10 Marks)**
   b. Explain smoothing linear filter in spatial domain for digital image. **(10 Marks)**

Module-3

5 a. Define DFT. Explain three properties of Discrete Fourier Transform (DFT). **(10 Marks)**
   b. Explain the steps involved in filtering in frequency domain. **(10 Marks)**

OR

6 a. Draw the block diagram of a homomorphic filtering approach for image enhancement and explain it. **(10 Marks)**
   b. Explain ideal, Butterworth and Gaussian high pass filter for image sharpening. **(10 Marks)**

Module-4

7 a. Explain how image segmentation algorithms are categorized. Discuss how point detection and line detection algorithm works. **(10 Marks)**
   b. Explain the concept of edge linking by using global processing via Hough transform and local processing. **(10 Marks)**

OR

8 a. Explain region growing and region splitting and merging for region based segmentation. **(10 Marks)**
   b. Define image threshold. Explain the thresholding methods for image segmentation. **(10 Marks)**

Module-5

9 a. With neat block diagram, explain image compression models. **(10 Marks)**
   b. Explain various types of data redundancies used in digital image compression. **(10 Marks)**

OR

10 a. Explain LZW coding with example. **(10 Marks)**
   b. Explain the Huffman error-free compression technique. Given the following symbols and their probability in table Q.10(b) of occurrence, calculate the code and average length of the code.

Symbol	Probability
a2	0.4
a6	0.3
a1	0.1
a4	0.1
a3	0.06
a5	0.04

   (10 Marks)

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