Total number of printed pages–5

53 (CS 715) DSIP

2021

(Held in 2022)

DIGITAL SPEECH AND IMAGE PROCESSING

Paper : CS 711

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

Answer ***any five*** *questions.*

1. 5×4

(a) What do you understand by image processing and computer vision ?

(b) Explain the gamma transformation with a diagram.

(c) Explain the geometric and affine transformations in detail.

(d) What is image registration ?

Contd.

2. 5×4

(a) Explain the forward and inverse transformations.

(b) Explain histogram matching for continuous and discrete cases.

(c) What are *two* basic properties of intensity values for image segmentation ?

(d) What is the difference between in line and point detection ?

3. 8+6+6

(a) How to convert the HSI color model in RGB ? Mention the formulation also.

(b) Describe tonal correction. How to use histogram equalization in color image ?

(c) Explain the color image smoothing with two methods. Which color component is useful in color image sharpening and segmentation ?

4. 5×4

(a) What is significance of redundancy in image compression? Mention the types of redundancy in digital images.

(b) Explain the coding redundancy. Use the table below which is related to gray-level distribution of an image to calculate the average number of bits required to represent each pixel. Find the redundancy value also.

r_k	$p_r(r_k)$	**Code 1**	$l_1(r_k)$	**Code 2**	$l_2(r_k)$
$r_0 = 0$	0.19	000	3	11	2
$r_1 = 1/7$	0.25	001	3	01	2
$r_2 = 2/7$	0.21	010	3	10	2
$r_3 = 3/7$	0.16	011	3	001	3
$r_4 = 4/7$	0.08	100	3	0001	4
$r_5 = 5/7$	0.06	101	3	00001	5
$r_6 = 6/7$	0.03	110	3	000001	6
$r_7 = 1$	0.02	111	3	000000	6

(c) Explain the fidelity criteria with the formulation of related errors.

(d) Explain the general compression model with the source encoder and decoder model diagram.

5. 5×4

(a) Explain the computer vision system with diagram.

(b) What do you mean by mathematical morphology ?

(c) Which morphological algorithm is used to extract the boundary in the image ?

(d) Define dilation and erosion with structuring element.

6. 5×4

(a) Define patterns and pattern classes with their arrangements.

(b) Use the tree descriptors for describing classes in satellite image of Kokrajhar town.

(c) What is the purpose of matching ? Explain the approaches used for matching in the images.

(d) What is the difference between perceptron and multilayer feed forward neural network model for pattern classes ?

7. (a) Write down the short notes on : ***(any two)*** 10

(i) Skeleton (Morphological)

(ii) Multi-Level Intensity Slicing

(iii) Color Slicing Transformation

(b) Differentiate between : ***(any two)*** 10

(i) Thinning and Thickening (Morphological)

(ii) Opening and Closing (Morphological)

(iii) Median filter and Majority filter (Morphological)