53 (CS 715) DSIP

2019

DIGITAL SPEECH AND IMAGE PROCESSING

Paper : CS 715

Full Marks : 100

Time : Three hours

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

*Answer **any five** questions.*

1. *(a)* Define the different processing level in digital image processing and also explain the working of an image formation model. 3

   (b) What are the key stages in digital image processing ? Mention each stage with diagram and example. 4

   (c) Define image sampling and quantization in digital image processing with a diagram. 7

Contd.

(d) What are the basic relationships among the pixels ? 6

2. (a) Calculate the chess board and city block distance for the pixels 'p_1' and 'p_2' with co-ordinates (5, 8), (18, 20) and shown in the matrix form. 4

(b) What are the types of image degradation ? Explain its model with a diagram. 4

(c) Explain the noise types with different criteria. 6

(d) What are the image restoration methods and geometrical transformations for image restoration ? 6

3. (a) What is the concept of spatial filtering and characterize into various categories ? 4

(b) What is utility of compression in an image ? Draw a diagram for compression scheme and image compression model. 6

(c) What is lossy predictive coding ? 4

(d) Classify the segmentation algorithms in various categories with small descriptions. 3

(e) Mention the three types of discontinuities in details. 3

4. (a) What is edge detection and describe the edge linking algorithms with properties also ? 6

(b) Explain the thresholding with their types in image segmentation. 5

(c) What is the principle of region growing algorithm and the steps of this algorithm ? 4

(d) What are the types of classification algorithms in object recognition ? 2

(e) Describe the decision-theoretic methods with the decision function and decision boundary. The given two mean vectors are $m_A = (3{\cdot}4, 1{\cdot}4)$ and $m_B = (4{\cdot}0, 2{\cdot}0)$ of two classes A and B respectively. What is the coming decision boundary using vectors ? 3

5. Write down the short notes on the following : ***(any four)*** 5×4=20

(i) Morphological operators

(ii) Skeletonization

(iii) JPEG compression techniques

(iv) K-NN Classifier

(v) Boundary extraction in morphological algorithms.

6. Differentiate between the following :
(any four) 5×4=20

(i) Mean filter *vs* Order-statistics filter

(ii) Metric (distance function) *vs* Topological properties of digital images

(iii) Gradient *vs* Laplacian filters

(iv) Shape matching *vs* String matching algorithms

(v) Parametric *vs* Non-parametric classification techniques.