

M.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2023.

Second Semester

Computer Science with Artificial Intelligence — Core
PATTERN RECOGNITION AND IMAGE ANALYSIS

(For those who joined in July 2022 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. _____ processing assumes that various objects are processed simultaneously.
(a) Serial (b) Parallel
(c) Both (a) and (b) (d) None
2. The _____ level determines the number of grey levels in the digitized image.
(a) Quantization (b) Sampling
(c) Both (a) and (b) (d) None

7. _____ refers to the spread of a data set around its mean value.
(a) Variance (b) Covariance
(c) Both (a) and (b) (d) None
8. The _____ is a statistical method commonly used in data analysis to determine if there is a significant association between two categorical variables.
(a) Huffman test (b) Chi Square test
(c) Both (a) and (b) (d) None
9. HMM stands for _____.
(a) Huffman Markov models
(b) Hough Markov Models
(c) Hidden Markov Models
(d) None
10. The maximum likelihood estimate for the variance σ^2 is _____, that is, the expected value over all data sets of sign of the sample variance is not equal to the true variance.
(a) biased (b) unbiased
(c) both (a) and (b) (d) none

3. Image _____ is a process applied to a graphics file to minimize its size in bytes without degrading image quality below an acceptable threshold.
(a) Recognition (b) Sampling
(c) Restoration (d) Compression
4. _____ truncation coding is a simple lossy image compression technique to compress monochrome image data.
(a) Contour (b) Run-length
(c) Block (d) None
5. Image segmentation involves converting an image into a collection of regions of pixels that are represented by a mask or a labeled image.
(a) Compression (b) Restoration
(c) Segmentation (d) None
6. Texture analysis attempts to quantify intuitive qualities described by terms such as _____ as a function of the spatial variation in pixel intensities.
(a) rough (b) smooth
(c) silky or bumpy (d) all the above

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) What is Image formation?
Or
(b) Give a brief note on Image Transformation.
12. (a) Differentiate : Constrained Versus Unconstrained Restoration.
Or
(b) What is Image Data Compression?
13. (a) What is Texture Analysis?
Or
(b) What do you mean by Region Growing?
14. (a) Define the terms : Expectation, Mean and Covariance.
Or
(b) Define the terms : Supervised, Unsupervised and Reinforcement learning.

15. (a) What is First Order Markov Models?
Or
(b) What do you mean by principal component analysis?

PART C — (5 × 8 = 40 marks)

Answer ALL the questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) What do you mean by serial and parallel image processing?
Or
(b) Discuss in detail about Stereo Imaging elements of Visual Perception.
17. (a) Explain Run length coding in detail.
Or
(b) Describe Huffman and other codes transform compression.
18. (a) What is segmentation? What are the different types of thresh holding approaches available? Explain any one.
Or
(b) Write short notes on the following :
(i) Remotely Sensed Image Analysis
(ii) Shape Matching

19. (a) Discuss in detail about the different types of pattern recognition approaches.

Or

- (b) Write down the design principle of Pattern recognition system.

20. (a) What is Normal Density? Explain Univariate and Multivariate density in detail.

Or

- (b) What is Expectation Maximization? With an example explain expectation maximization for a 2D Normal model.