

(Following Paper ID and Roll No. to be filled in your Answer Book)

Paper ID : 110754

Roll No.

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**B.Tech.**

**(SEM. VII) THEORY EXAMINATION, 2015-16**

**PATTERN RECOGNITION**

**[Time:3 hours]**

**[Maximum Marks:100]**

**Section-A**

**Q.1 Attempt all parts. All parts carry equal marks. Write answer of each part in short. (2×10=20)**

- (a) Write the difference between classification and clustering.
- (b) If A, B, C are three mutual exclusive and exhaustive events and  $P(B)=\frac{1}{3} P(A)$ ,  $P(C)=\frac{1}{2} P(A)$ , find  $P(A)$ ,  $P(B)$  and  $P(C)$ .
- (c) Two cards are drawn from a full packet of 52 cards, the first card being returned to the packet before the second is drawn. Find the probability that these two cards are of the same suit.

- (d) What is the difference between parametric and non parametric pattern recognition methods?
- (e) What is the probability of obtaining 9, 10, and 11 points with 3 dice?
- (f) How do we evaluate the performance of a classifier?
- (g) What do you mean by fuzzy decision making? Also discuss the fuzzy classification using suitable example.
- (h) Write difference between learning and adaptation.
- (i) Discuss mean and covariance with an example.
- (j) Name the different methods of non-parameter estimation strategies. What are the main differences between them?

### Section-B

**Note: Attempt any five questions from this section.**

10×5=50

- Q2. What is a discriminant function? Discuss it in detail. In a two class problem, the likelihood ratio is given as follows:  $p(x/C1)/p(x/C2)$ . Write the discriminant function in terms of the likelihood ratio.

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- Q3. What do you mean by fuzzy decision making? Also discuss the fuzzy classification using suitable example.
- Q4. Prove that the mean and the standard deviation of the binomial distribution are  $np$  and  $\sqrt{npq}$  respectively.
- Q5. In an experiment on the immunization of goats from a disease, the following results were obtained:

	Died or disease	Survived	Total
Calculated with vaccine	2	10	12
Not inoculated	6	6	12
Total	8	16	24

Derive your inference on the efficiency of vaccine.

- 6. What is dimension reduction? Discuss Principal Component Analysis (PCA) algorithm for dimension reduction.
- 7. Estimate a density function using a symmetric triangular kernel with a base width of 2, given that your samples are at 2, 3, 3, and 4. Explain with diagram.
- 8. How the k-nearest neighbor method works? Explain with KNN estimation and KNN rule.

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P.T.O.

9. Explain the concept of expectation maximization with the help of an algorithm.

### Section-C

**Note: Attempt any two questions from this section.**

(15×2=30)

10. (a) What is Hidden Markov Model (HMM)? Explain following in HMM
- (i) Forward algorithm
  - (ii) Backward algorithm
- (b) What is normal distribution? Explain.
11. Explain sum of squared error criterion and related minimum variance criteria for clustering? Discuss what kind of clustering problems are suited to sum-of-squared criterion.
12. Write short notes on:
- a) Chi-square test
  - b) K-means partition algorithm
  - c) Clustering

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