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Question Paper Code: 52928

M.E. DEGREE EXAMINATION, JUNE 2016

Elective

Communication Systems

15PCM529 - PATTERN RECOGNITION

(Regulation 2015)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 20 = 100 Marks)

1. (a) Explain the following and discuss their significance in pattern recognition with suitable example:
- (i) Mean and Covariance
 - (ii) Chi square test. (20)

Or

- (b) What do you mean by pattern recognition? Explain. Describe design principles of pattern recognition system with an example. (20)
2. (a) Explain mathematically the Baye's formula as expressed in English by the expression.

Posterior = (likelihood X prior) / evidence

Hence state the Bayes decision rule. (20)

Or

- (b) What is discriminant function? Discuss in detail. In a two class problem, the likelihood ratio is given as follows:

$$p(X | C_1) / p(X | C_2)$$

Write the discriminant function in terms of the likelihood ratio. (20)

3. (a) Why parameter estimation is an important issue in pattern recognition? What are the two methods usually considered for this? Illustrate any one of them considering a Gaussian case of unknown μ and Σ . (20)

Or

- (b) Let us assume that there are m samples in n dimensional space. Describe the mathematical components required to compute the n principal components for each sample. Describe how Principal Component Analysis (PCA) will enable dimensionality reduction. Put the above details in an algorithmic structure. (20)

4. (a) Starting from fundamentals derive an expression for density estimation

$$P_n(X) = \frac{K_n / n}{V_n}. \quad (20)$$

Or

- (b) Explain Parzen window estimation. Illustrate with diagrams. (20)

5. (a) Illustrate with dendrogram the hierarchical agglomerative clustering and the hierarchical division clustering. Bring out the differences in the computational procedures involved in both of them. (20)

Or

- (b) Explain the following:

(i) K-means clustering and

(ii) Trace criteria for clustering (20)