Total No. of Questions : 12]

SEAT No. :

P2802

[Total No. of Pages : 3

[5154]-184
B.E. (Comp. Engg.)
PATTERN RECOGNITION
(2008 Pattern) (Semester - II) (Elective - III) (410450 A)

Time : 3 Hours] *[Max. Marks :100*

Instructions to the candidates:

1) ***Answer any 3 questions from each section.***
2) ***Answers to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right side indicate full marks.***
5) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
6) ***Assume Suitable data, if necessary.***

SECTION-I

Q1) a) Define feature, feature vector and classifiers. **[6]**

b) Compare supervised and unsupervised pattern recognition. **[4]**

c) State and explain the basic stages involved in the design of a classification system. **[8]**

OR

Q2) a) What is mean by pattern classifier? State and explain different approaches to pattern classifier. **[10]**

b) What is the need of Pattern recognition? State and explain the applications of Pattern Recognition. **[8]**

Q3) a) Explain Bayes loss and risk function. Explain Bayes minimum error rate pattern classifier. **[8]**

b) Define within-class scatter matrix & between-class scattern matrix. Discuss the discriminant analysis for 2-class problem. **[8]**

OR

Q4) a) Explain Bayes theorem for pattern classification? Explain Bayes classifier for Gaussian classes. **[8]**

b) Explain Linear Discriminate Functions and Decision Hyper plane. **[8]**

P.T.O.

Q5) a) Define and Explain following Criterion.

i) Bayes

ii) Maximum a Post priori

iii) Maximum-likelihood. **[6]**

b) Define Discriminant function. Give the discriminant function for following criterion-Bayes, Maximum a post priori, Maximum likelihood. **[10]**

OR

Q6) a) Explain Gaussian Mixture Models and Expectation-maximization method. **[8]**

b) Write a note on Bayesian estimation. **[8]**

SECTION-II

Q7) a) What is mean by Context-dependent classification? Explain Discrete Hidden Markov Model. **[8]**

b) Explain the need of Dimension reduction methods. State how principal component help for dimension reduction. **[8]**

OR

Q8) a) State dimension reduction methods. Explain Fisher discriminant analysis. **[8]**

b) Write a note on Continuous density hidden markov models. **[8]**

Q9) a) State and explain non-parametric techniques for density estimation. **[8]**

b) In order to select best candidates, school entrance exam on two subjects of English and Mathematics. Suppose that we know the marks and the classification results of 5 applicants as in the table below. If an applicant has been accepted this is denoted as class 1, otherwise class 2. Use the nearest neighbor rule and sum of square distance measure to determine if Ajay should be accepted if his marks of English and Mathematics are 70 and 70 respectively. Using the same example determine if Ajay should be accepted with k-nearest neighbor rule, with k=3. **[10]**

Candidate No.	English	Math	Class
1	80	85	1
2	70	60	2
3	50	70	2
4	90	70	1
5	85	75	1

OR

Q10)a) What is Non-parametric density estimation. Explain Parzon window density estimation. **[8]**

b) Write a note on : **[10]**

i) Perceptron Algorithm

ii) support vector machine.

Q11)a) What is nominal data? Explain the concept of Decision tree with example. **[8]**

b) What is clustering? Explain K-mean clustering algorithm. **[8]**

OR

Q12)a) Create by hand a dendogram for the following six points in one dimension using hierarchical clustering - single linkage metrics based in Euclidian distance.

D = {662, 887,255,412,996} **[8]**

b) Write a note on Non-metric methods for pattern classification. **[8]**