

UNIVERSITY OF PUNE

[4364]-774

B. E. (Computer Engineering) Examination - 2013

(Pattern Recognition)

(410450)(2008 Course)

[Time: 3 Hours]

[Max. Marks: 100]

Instructions:

- 1 Answer **any three** from each section.
- 2 Assume suitable data, if necessary.
- 3 Answers to the **two sections** should be written in **separate answer-books**.
- 4 Draw neat diagrams wherever necessary.
- 5 Figures to the right indicate **full marks**.

SECTION -I

Q.1 A Describe the basic modules in designing a pattern 8
recognition system.

B Explain the terms feature, feature vector, pattern and 8
classification with example.

OR

Q.2 A Compare supervised and unsupervised pattern 8
recognition.

B Define Pattern recognition. State various applications of 8
pattern recognition.

Q. 3 A Define Bayes rule. What is probability density function? 8
Define minimum error rate classification.

B What is discriminant function? Explain how Bayesian 8
can help for multi-classification problem?

OR

Q. 4 A Explain Bayes criterion, and Maximum a 8
Posteriori(MAP) criterion in detail.

B Define the terms loss, risk, decision rule and bayes risk. 8

- Q. 5 A Explain various parameter estimation method of pattern classification. 8
- B Write note on 10
- i. Expectation maximization method
 - ii. Bayesian estimation

OR

- Q. 6 A Discuss Maximum Likelihood approach used for parameter estimation. 8
- B Explain Gaussian mixture model for density estimation? 10
What are the advantages of Gaussian mixture model over other estimation?

SECTION II

- Q. 7 A Define within-class scatter matrix & between-class scatter matrix. Discuss the discriminate analysis for 2-class problem 8
- B What is the role of Dimension reduction in pattern recognition? State and explain different methods for Dimension reduction 10

OR

- Q. 8 A What is mean by Context-dependent classification? Explain Discrete Hidden Markov Model and Continues Density Hidden Markov. 10
- B Explain Principal Component analysis for dimension reduction. 8
- Q. 9 A Explain non-parametric techniques for density estimation. Explain Kernel density estimation. 8
- B Explain linear Support vector machine in detail. 8

OR

- Q. 10 A In order to select best candidates, school entrance exam on two subjects of English and Mathematics. Suppose 8

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 neighbour rule, with $k=3$

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

B Explain linear discriminant function and decision hyper plane in detail. 8

Q. 11 A What is pattern clustering? How it differs from classification? Explain K-mean clustering algorithm 8

B What is Non-metric data? State and explain the technique used for classification of Non-metric data. 8

OR

Q. 12 A What is the difference between classification and clustering? State and explain various techniques used for clustering. 8

B Explain Hierarchical clustering with different linkage metrics. 8