

EC-413-3 PATTERN RECOGNITION

Time: 1.5 Hours

Max. Marks: 20

Note: Assume suitable missing data, if any.

Q.No.1

[3+2=5]

- [a] Discuss the various application of pattern recognition. Also, describe the PR system with suitable flow diagram.
- [b] Discuss the need of learning in PR system and describe various learning approaches used in PR system.

Q.No.2

[2+3=5]

Consider the data items collected from market as given in Table I. The features of the items include cost of the item (Rs.), size of the item (Cm³), colour of the object and the class label.

- [a] Which feature is the most appropriate and why for classification?
- [b] Classify a test sample of [100, 10, Red] based on some appropriate logic.

Table I

Item No.	Cost in Rs.	Volume in cm ³	Colour	Class label
1	10	6	Blue	Inexpensive
2	15	6	Blue	Inexpensive
3	25	6	Blue	Inexpensive
4	150	1000	Red	Expensive
5	215	100	Red	Expensive
6	178	120	Red	expensive

Q.No.3

[2+3=5]

- [a] Derive the expression of Linear discriminant function for two class problem.
- [b] Discuss the role of GLCM Matrix. Consider an image $f(x, y)$ as given below:

$$f(x, y) = \begin{bmatrix} 1 & 2 & 2 & 2 \\ 1 & 1 & 3 & 3 \\ 2 & 2 & 7 & 7 \\ 4 & 4 & 5 & 5 \end{bmatrix}$$

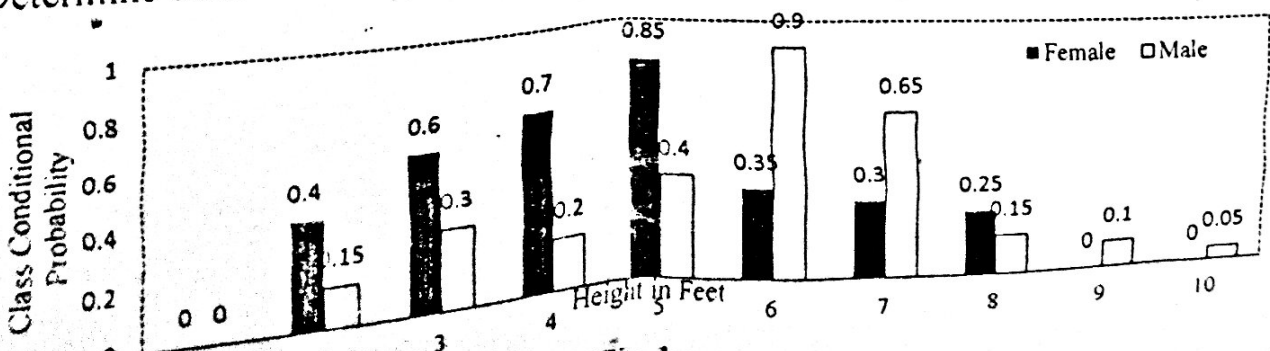
Determine the GLCM matrix of the image $f(x, y)$ in the direction $\begin{bmatrix} X \\ Y \end{bmatrix}$.

Q.No.4

[3+2=5]

A sample data is collected through a digital stadiometer of 1200 peoples and out of these 500 samples are female. The distribution of collected data samples is as shown in Fig. 1.

- [a] Classify an unknown sample of height 7 feet belongs to male or female class on the basis of Bayesian Decision Theory. **Decision Rule: Male if weight > 58 Kg, otherwise Female**
- [b] Determine classification error.



Total No. of Pages: 02

EIGHT SEMESTER

END SEMESTER EXAMINATION

Roll No

B.Tech (ECE)

May-2017

EC-413-3 PATTERN RECOGNITION

Time: 3 Hours

Max. Marks: 70

Note: Answer any FIVE questions.

Assume suitable missing data, if any.

Q.No.1

[7x2=14]

- [a] State and Explain the role of the Features, Feature Vectors and Classifier in the context of pattern recognition.
- [b] What are the various applications of pattern recognition systems? Also discuss the various issues involved in pattern recognition system.

Q.No.2

[7x2=14]

- [a] How can error in linear SVM be minimized? And also discuss how a kernel form of SVM is better in some scenarios.
- [b] Consider an 8-chain code of object [0, 0, 0, 0, 0, 7, 6, 6, 6, 6, 6, 5, 4, 4, 4, 4, 4, 3, 2, 2, 2, 2, 2, 1].
- Draw the shape of object
 - Determine difference code
 - Determine shape number

Q.No.3

[10+4=14]

The sales of a company (in Cores) for each year are shown in the table below.

X (Year)	2005	2006	2007	2008	2009
Y (Sales)	12	19	29	37	45

- [a] Use the least square regression line as a model to estimate the sales of the company in 2012.
- [b] Compute the standard error of the estimate.

Q.No.4

[14]

Given the 2-d data for two classes $\omega_1 = [(1,1), (1,2), (1,4), (2,1), (3,1), (3,3)]$ and $\omega_2 = [(2,2), (3,2), (3,4), (5,1), (5,4), (5,5)]$. Determine the optimal projection line in a single dimension using Fisher Linear Discriminant Method.

Q.No.5

[14]

Consider a pattern as given in Fig.1, which consist of the various objects belongs to different classes.

$$\begin{array}{c}
 \begin{bmatrix}
 \emptyset & \emptyset & * & * & \emptyset \\
 * & * & * & * & \exists \\
 \exists & \emptyset & X & \emptyset & \exists \\
 * & \exists & * & \emptyset & * \\
 * & * & \exists & \exists & \exists \\
 \vdots & \vdots & \vdots & \vdots & \vdots
 \end{bmatrix}
 \end{array}$$

Fig.1

Classify an unknown pixel 'X' as given in Fig. 1 using Naïve Bayes classifier.

Q.No.6

[4+10=14]

- [a] What are the various methods to evaluate the classifier performance?
- [b] Two retrieval systems, X and Y , are being compared. Both are given the same query, applied to a collection of 1500 documents. System X returns 400 documents, of which 40 are relevant to the query. System Y returns 30 documents, of which 15 are relevant to the query. Within the whole collection, there are in fact 50 documents relevant to the query. Tabulate the results for each system, and compute the precision and recall for both X and Y .

Q. No. 7

[7x2=14]

- [a] Define PCA. Describe the PCA algorithm for finding out Principle component. Also, List out the differences between LDA and PCA.
- [b] Discuss the problem of over-fitting and layout the solutions to handle this problem.