

## MID SEMESTER EXAMINATION

March-2016

## EC-413-3 PATTERN RECOGNITION

Time: 1.5 Hours

Max. Marks: 20

**Note:** Answer any **FOUR** questions.  
Assume suitable missing data, if any.

Q. No.1

[3+2=5]

[a] Discuss the design flow of pattern recognition system.

[b] For the effective and robust representation of an object, what are important characteristics that a feature vector should have?

Q. No.2

[5]

A hand posture dataset is generated by recording the hand postures of 20 male and 10 female. The type of hand postures generated by each person is as shown in Fig.1.



Fig.1

A machine learned classifier is design and a test scheme 6-fold cross validation is used to compute the accuracy of the classifier. Draw the confusion matrix for 80% classification accuracy of each class.

Q. No.3

[5]

[a] Discuss the design flow of pattern recognition system.

[b] What is need of training in a classifier? And discuss its types.

Q.No.4

[5]

Consider the data items bought in a supermarket. The features includes cost of the item, size of the item, colour of the object and the class label. The data is shown in the following table. Which feature would you like to use for classification? Why?

Item No.	Cost in Rs.	Volume in Cm <sup>3</sup>	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. 5

[5]

Write short notes on the followings:

[a] What are various kind of pattern representation ways?

[b] Explain Bayesian Belief Network (BNN).

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Total No. of Pages: 2  
**EIGHT SEMESTER**  
**END SEMESTER EXAMINATION**

Roll No. 01  
**B.Tech. (ECE)**  
**May-2016**

**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] What is Pattern Recognition? Also describe the importance of pattern recognition in computer vision.  
[b] Describe the flow diagram of Pattern Recognition System and its application in various fields.

**Q.No.2**

[7x2=14]

A feature vector  $x$  is uniformly distributed in the range of  $0 \leq x \leq 4$  for class A and  $3 \leq x \leq 8$  for class B. The prior probabilities of class A and B are 0.4 and 0.6, respectively. Classify a feature vector having value 3.5 using

- [a] Bayesian Classifier ✓  
[b] Naïve Bayes Classifier

**Q.No.3**

[14]

A sample of training data of 11 persons of watching a movie is given as in Table 1.

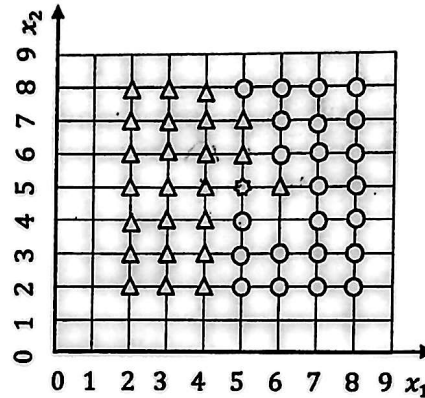
SNo.	Money (Rs.)	Has Exam	Weather	Goes-to-Movie
1.	25	No	Fine	No
2.	200	No	Hot	Yes
3.	100	No	Rainy	No
4.	125	Yes	Rainy	No
5.	30	Yes	Rainy	No
6.	300	Yes	Fine	Yes
7.	55	Yes	Fine	Yes
8.	140	No	Hot	No
9.	20	Yes	Fine	No
10.	175	Yes	Fine	Yes
11.	110	No	Fine	Yes

Classify a test sample of a person that whether he/she will go for watching movie, or not if he/she has Money = Rs. 90, Has - Exam = Yes, and Weather = Fine using Naïve Bayes Classifier.

**Q.No.4**

**[14]**

Consider the samples of data points of two equiprobable classes which are as shown in Fig. 1. The total number of sample of triangles (class 1) are 24 and total number of squares (class 2) are 23. Classify, a star test point as shown in Fig.1 using K-nearest neighbor density estimation. The value of K is 5.



**Fig. 1**

**Q.No.5**

**[7x2=14]**

- [a] What is perceptron algorithm? And describe the convergence of perceptron algorithm.
- [b] A linear classifier is designed with latest weight vector computed through perceptron algorithm is  $x_1 + x_2 = .5$  with  $\rho_t = 0.8$ . This classifier classifies all the sample of two classes correctly except two samples. One miss classified samples belongs to class 1 i.e.  $[0.4, 0.05]^T$  and other belongs to class 2 i.e.  $[-0.20, 0.75]^T$ . Determine the next update weight of this classifier so that these two samples can be correctly classified.

**Q.No.6**

**[5+5+4=14]**

Write the shot notes on the followings

- [a] Support vector machine
- [b] Linear regression model
- [c] Importance of convergence of a classifier