M.TECH. COMPUTER TECHNOLOGY SECOND YEAR SECOND SEMESTER - 2018

Sub: PATTERN RECOGNITION   Time: 3 hours   Full marks:100

Answer any 5 questions

1. a. What do you mean by Prior and Posterior Probability? What is Zero Conditional Probability for Naïve Bayes Classifier? How does the Naïve classifier address the Zero Conditional Probability?   4+3 +3

    b. The following table is given   10

Day	Outlook	Temperature	Humanity	Wind	Play Tennis
D1	Sunny	Hot	High	Weak	No
D2	Sunny	Hot	High	Strong	No
D3	Overcast	Hot	High	Weak	Yes
D4	Rain	Mild	High	Weak	Yes
D5	Rain	Cold	Normal	Weak	Yes

What will be the condition to play tennis if Outlook=Rain, Temperature= Mild, Humanity=High and Wind=Strong?

2. a. What are the fundamental differences between Feature Selection and Dimensionality Reduction techniques? What is Principal Component Analysis (PCA)? Write the basic algorithm of Principal Component Analysis (PCA).   3+2 +5

    b. Compute the linear discriminant projection for the following two-dimensional dataset.   10

$$X1=(x1,x2)=\{(4,1),(2,4),(2,3),(3,6),(4,4)\}$$
$$X2=(x1,x2)=\{(9,10),(6,8),(9,5),(8,7),(10,8)\}$$

3. a. What are the differences between Perceptron Learning Rule and Gradient Descent Learning Rule? What do you mean by Universal Approximation Theorem?   3+3

    b. What is Radial Basis Function Network? What are the differences between Radial Basis Function Networks and Multi-layer Networks? How do you solve the Ex-NOR problem using RBFN? Mention every steps on it.   3+3 +8

4. a. What is Correlation? Why Correlation is computationally intensive? Discuss about the Grey-Level Image Template Matching technique with proper example. 3+3 +4

    b. What are the limitations of Sequential forward Selection and Sequential Backward Selection techniques? Write the basic algorithm of GA. 5+5

5. a. What are the pros and cons of Hierarchical and Partitional Clustering? What are the differences between Single-Linkage and Complete –Linkage Algorithm? 5+5

    b. What is Curve Fitting? Write briefly about the different types of approaches of Curve Fitting. What is Least Square Regression? Write down Criteria for a Best fit and Least-Squares fit of a straight line along with the goodness of the fit? 2+3 +2+ 3

6. a. Calculate the Maximum Likehood Estimate for univariate Gaussian function where μ and σ are unknown. What are the differences between MLE and BLE? When will you choose MLE over MAP and why? 10+5 +5

7. a. What is Kernel Trick in Support Vector Machine? What do you mean by Mercer's Theorem? Discuss about Inner-product Kenel in Support Vector Machine viewed as a Kernel Machine? 3+3 +6

    b. What is cluster validity index? Suppose a dataset has six points, each of which has two features F1 and F2. The data set is listed below. Use FCM to partition the dataset into two clusters(the parameter c=2), assume the parameter m in FCM is 2. and the initial values are V1 = (5,5) and V2 = (10,10) for cluster 1 and 2 respectively. 8

	f1	f2
X1	2	12
X2	4	9
X3	7	13
X4	11	5
X5	12	7
X6	14	4