

End Semester Examinations - 2015-16 Even Semester - May 2016

14CS2013 Machine Learning Principles and Applications

Set B

Time : 3 hrs
Total Marks: 100

1. Explain the k-mean clustering algorithm with any classical example using the equations to minimize the total reconstruction error.

OR

2. s_1 = red, s_2 = blue and s_3 = green represent different states of a HMM with the initial probabilities of 0.5, 0.2 and 0.3 for s_1 , s_2 and s_3 respectively. Below is the transition matrix of the HMM.

	s_1	s_2	s_3
s_1	0.4	0.3	0.3
s_2	0.2	0.6	0.2
s_3	0.1	0.1	0.8

- a. Draw the HMM structure representing the different transition probabilities.
b. What will be the probability of the following transition “red, red, green, green”?

3. Derive the maximum likelihood estimation for

- a. Bernoulli density
b. Multinomial density
c. Gaussian (Normal) density

OR

4. Consider a database D (figure). Suppose the minimum support count required is two. Find out the frequent item set using Apriori algorithm.

TID	List of items
T100	I1, I2, I5
T100	I2, I4
T100	I2, I3
T100	I1, I2, I4
T100	I1, I3
T100	I2, I3
T100	I1, I3
T100	I1, I2, I3, I5
T100	I1, I2, I3

5. Perform a comparative study on the working of human brain and neural networks with neat labelled diagram.

OR

6. Represent the following HMM model in terms of graphical model

- a. Input output HMM
b. Factorial HMM
c. Coupled HMM
d. Switching HMM

Also state the order of each HMM model

7. What are the applications of machine learning in different fields?

OR

8. Perform a multidimensional scaling for the following data

	A	B	C	D	E	F	G
A	-						
B	2	-					
C	1	3	-				
D	5	3	6	-			
E	4	2	5	4	-		
F	8	6	9	3	4	-	
G	1	1	2	4	3	7	-

9. Consider the following data

x	y
45	6
35	10
40	10
45	10
50	10
55	10
65	10
35	15
40	15
60	20
5	25
40	25
50	25
55	25
5	30
55	30
70	30
10	32
10	40

- a. On a graph sheet plot the data and find the best hyperplane separating the two classes.
- b. What will be the minimum number of support vectors for the best hyperplane?