[6180]-139

T.E. (Information Technology)
MACHINE LEARNING
(2019 Pattern) (Semester - I) (314443)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right side indicate full marks.*
4) *Assume Suitable data if necessary.*

Q1) a) Compare univariate and multivariate linear regression. **[CO3,L2]** **[6]**

b) Describe the tradeoff between bias and variance using dart example. **[CO3,L1]** **[5]**

c) Compute the R-Square error of the best fit line "Y = – 0.94X+43.7" for below input instance space. **[CO3, L3]** **[7]**

Sr.No.	X	Y
1	3	40
2	10	35
3	11	30
4	15	32
5	22	19
6	22	26
7	23	24
8	28	22
9	28	18
10	35	6

OR

P.T.O.

Q2) a) Explain gradient descent technique for optimization in linear regression with example. **[CO3, L1]** **[6]**

b) Explain the cost function used to evaluate the performance of regression. **[CO3, L3]** **[6]**

c) What is least square method? Explain least square method in the context of regression. **[CO3, L1]** **[6]**

Q3) a) Describe Bayesian network in short for learning and inferences. **[CO4, L3]** **[8]**

b) Explain naïve bays algorithm? For below dataset compute the posterior probability of banana class using Bayes rule. **[CO4, L3]** **[7]**

Fruit	Yellow	Sweet	Long	Total
Orange	350	450	0	650
Banana	400	300	350	400
Other	50	100	50	150
Total	800	850	400	1200

c) Write any four applications of naïve Bayes classifier. **[CO4, L1]** **[2]**

OR

Q4) a) Explain ID-3 decision tree algorithm in detail with example.**[CO4, L2][8]**

b) Explain the following measures of impurity with example.**[CO4, L2] [9]**

i) Information Gain ii) Gini Index iii) Entropy

Q5) a) Explain K-Nearest Neighbor algorithm with example. **[CO5, L2] [7]**

b) Suppose we have the following dataset that has various transactions and from this dataset, we need to find the frequent item sets and generate the association rules using the Apriori algorithm. Given minimum support =2 and minimum confidence = 50%. **[CO5, L4]** **[8]**

TID	ITEM SET	TID	ITEM SET
Tl	A,B	T6	B,C
T2	B,D	T7	A,C
T3	B,C	T8	A, B, C, E
T4	A, B, D	T9	A, B, C
T5	A, C		

c) Explain any one of the following terms: **[CO5, L2]** **[3]**

   i)   Medoid   OR   ii)   Dendrogram

OR

Q6) a) Cluster the following eight points (with (x, y) representing locations) into three clusters: A1(2, 10), A2(2, 5), A3(8, 4), A4(5, 8), A5(7, 5), A6(6, 4), A7(1, 2), A8(4, 9) Initial cluster centers are: A1(2, 10), A4(5, 8) and A7(1, 2). The distance function between two points a = (x1, y1) and b = (x2, y2) is defined as-P(a, b)= |x2–x1|+|y2—y1| Use K-Means Algorithm to find the three cluster centers after the first iteration. **[CO5, L3]** **[9]**

b) Explain the Apriori algorithm in brief. Explain the following performance measure of association rule mining. **[CO5, L2]** **[6]**
1)   Support   2)   Confidence   3)   Lift

Explain any one of the following distance metrics with example. **[CO5, L1]** **[3]**

1)   Euclidean Distance   2)   Manhattan Distance

3)   Hamming Distance

Q7) a) Explain perceptron learning algorithm? Describe shortly about how learning parameters are updated in multi-layer perceptron. **[CO6, L3]** **[8]**

b) Explain Sigmoid, Tanh and Relu activation functions in detail. **[CO6, L2]** **[9]**

OR

Q8) a) Explain the simulation of AND gate using McCulloch Pitts Neuron? What is vanishing gradient descent problem. **[CO6, L2]** **[9]**

b) Explain what is Deep Learning and its different architectures? State the **[CO6, L2]** various applications of deep learning. **[8]**

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[6180]-139   3