

Roll No. 20001017032

Total Pages : 5

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December 2023

B.Tech. (EElOT) VIIth SEMESTER

Artificial Intelligence and Machine Learning Theory (EE-IOT-EL-701)

Time : 3 Hours]

[Max. Marks : 75

Instructions :

1. It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.
2. Answer any four questions from Part-B in detail.
3. Different sub-parts of a question are to be attempted adjacent to each other.

PART-A

1. (a) Define Machine learning. (1.5)
(b) Define Regression and state its purpose in machine learning. (1.5)
(c) Define the requirements of Bayesian Learning. (1.5)
(d) Define clustering and Outliers. (1.5)
(e) Compare classification with regression with an example. (1.5)
(f) Define Pre-norm Normal Form. *Pen-norm* (1.5)
(g) Illustrate the role of Information Gain in Decision Tree. (1.5)

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- (h) Explain the concept of Support Vectors in SVM along with example. (1.5)
- (i) Define single layer perceptron with diagram. (1.5)
- (j) Define Unsupervised learning with a suitable example. (1.5)

PART-B

2. (a) Discuss in detail :
- (i) Depth first search.
 - (ii) Breadth first search.
 - (iii) Alpha Beta pruning.
 - (iv) Best first search. (10)
- (b) The values of independent variable x and dependent value y are given below : (5)

X	Y
0	2
1	3
2	5
3	4
4	6

- (a) Find the least square regression line equation $y = ax + b$ for the given data points.
- (b) Estimate the value of y when x is 10.

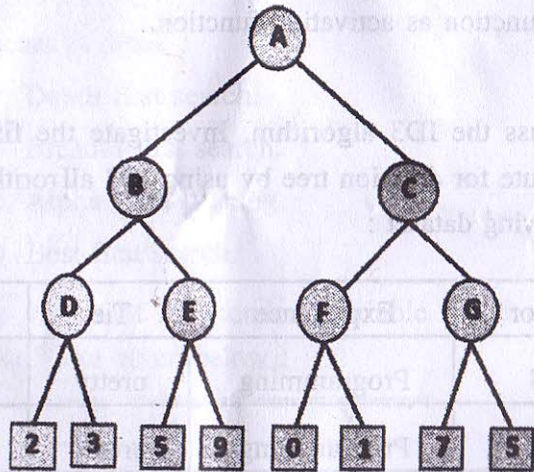
$3 = a + b$
 $5 = 2a + b$
 $2a + b = 5$
 $a + b = 3$

3. (a) Illustrate loss function in logistic regression (Y-axis loss function and x axis log probability) for two class classification problem. (5)
- (b) Explain multi-neural network. Predict the output Y of a three-input neuron with bias. The input feature vector is $(x_1, x_2, x_3) = (0.8, 0.6, 0.4)$ and weight values are $[w_1, w_2, w_3, b] = [0.2, 0.1, -0.3, 0.35]$. Use sigmoid function as activation function. (10)
4. Discuss the ID3 algorithm. Investigate the first splitting attribute for decision tree by using ID3 algorithm with the following dataset : (15)

Major	Experience	Tie	Hired?
CS	Programming	pretty	NO
CS	Programming	pretty	NO
CS	Management	pretty	YES
CS	Management	ugly	YES
Business	Programming	pretty	YES
Business	Programming	ugly	YES
Business	Management	pretty	NO
Business	Management	pretty	NO

5. (a) Explain the Rule Based Systems in detail. (5)
 (b) Discuss A* Algorithm in detail. Show dry run by taking any suitable example. (10)

6. (a) Define Alpha-beta Pruning. Discuss the condition for Alpha-beta pruning. Explain the working of Alpha-Beta pruning. Solve the example given below. (10)



- (b) Discuss the ensemble methods and its types. (5)

7. Explain Bayes' Theorem with an example. Define Naive Bayes and its applications. Discuss the pros and cons. Explain the working of Naive Bayes' Classifier and by using the example below find if the weather is sunny, then the player should play or not? (15)

	Outlook	Play
0	Rainy	Yes R
1	Sunny	Yes S
2	Overcast	Yes
3	Overcast	Yes
4	Sunny	No S
5	Rainy	Yes R
6	Sunny	Yes S
7	Overcast	Yes
8	Rainy	No Rn
9	Sunny	No S
10	Sunny	Yes S
11	Rainy	No Rn
12	Overcast	Yes
13	Overcast	Yes