VIT
Vellore Institute of Technology

Reg. No: 21BIT0288

# Final Assessment Test – November 2024

Course: BITE410L - Machine Learning

Class NBR(s): 3524

Slot: B1+TB1

Time: Three Hours

Max. Marks: 100

- KEEPING MOBILE PHONE/ANY ELECTRONIC GADGETS, EVEN IN 'OFF' POSITION IS TREATED AS EXAM MALPRACTICE
- DON'T WRITE ANYTHING ON THE QUESTION PAPER

**Answer ALL Questions**

**(10 X 10 = 100 Marks)**

1. Define reinforcement learning and also elaborate its role in ML differentiate it from supervised and unsupervised learning.

2. Calculate the correlation coefficient (Pearson product) for the given two variables. Are they positively or negatively correlated?

Dataset

| X | Y |
|---|---|
| 60 | 77 |
| 30 | 60 |
| 44 | 74 |
| 50 | 30 |
| 40 | 77 |
| 80 | 60 |
| 59 | 44 |
| 32 | 33 |

3. The table gives the profile of customers (Refund, Marital Status & Taxable Income) who has taken loan from a bank. The table also shows how many of them really cheated the bank. Using Naïve Bayesian classifier Algorithm classify the customer as whether they will cheat or not based on the 3 attributes (Yes, married,>80k)

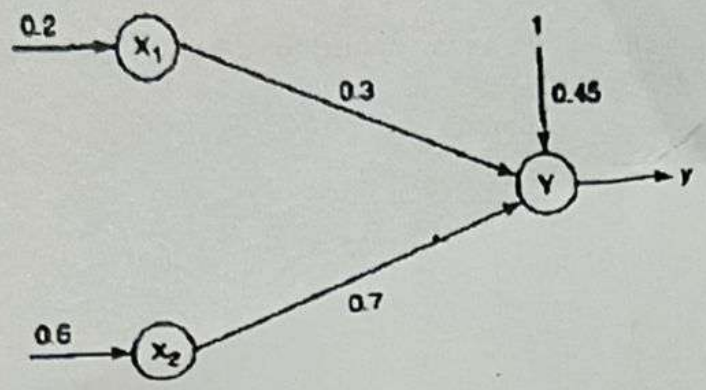
| SL No | Refund | Marital Status | Taxable Income | Cheat |
|---|---|---|---|---|
| 1 | Yes | Single | > 80 K | No |
| 2 | No | Married | > 80 K | No |
| 3 | No | Single | < 80 K | No |
| 4 | Yes | Married | > 80 K | No |
| 5 | No | Divorced | > 80 K | Yes |
| 6 | No | Married | < 80 K | No |
| 7 | Yes | Divorced | > 80 K | No |
| 8 | No | Single | > 80 K | Yes |
| 9 | No | Married | > 80 K | No |
| 10 | No | Single | > 80 K | Yes |

4. Suppose a group of 12 sales price records has been sorted as follows:
215, 10, 204, 13, 35, 15, 50, 55, 92, 72, 11, 5
Normalize the above values using min-max [0, 1] and Z-Score Normalization.

5. Describe the five basic type of neuron connection architectures with a neat diagram.

6. a) What is the necessity of activation function? List out the commonly used activation functions. **[5]**

b) Calculate the net input for the network shown in the given figure with the bias included in the network. **[5]**




7. *Use the k-means algorithm and Euclidean distance to cluster the following 7 data points into 3 clusters:* A1 = (2, 10), A2 = (2, 5), A3 = (8, 4), A4 = (5, 8), A5 = (7, 5), A6 = (6, 4), A7 = (1, 2). Initial seeds are A1, A4 and A7.

8. Explain Hierarchical clustering in detail and differentiate agglomerative hierarchical clustering approach from divisive hierarchical clustering approach with diagram.

9.a) Compare and contrast Bagging and Boosting in the context of ensemble learning.

**OR**

9.b) Explain the metrics of accuracy, precision, recall, and F1-score, highlighting their importance in model evaluation.

10.a) What is the role of Markov Decision Process in reinforcement learning and explain in detail with real time examples.

**OR**

10.b) How does Q-Learning works? Explain in detail the key components of Q-learning.

⇔⇔⇔ **BG/K/TX** ⇔⇔⇔

Exploits exploit