2811E834

Candidate's Seat No :_____

M.Sc Sem-3 Examination

504

AMS

Time : 2-30 Hours] **November-2024** **[Max. Marks : 70**

Instructions: All questions are compulsory. Use of non-programmable scientific calculator is allowed.

Q.1 **(a)** Discuss the importance of data preprocessing in machine learning, including at least three specific techniques used in the process. (07)

(b) Explain the relationship between Artificial Intelligence, Machine Learning and Deep Learning. (07)

OR

(a) Explain the roles of the training set, validation set, and testing set in machine learning. Additionally, discuss best practices for allocating data among these sets. (07)

(b) Explain the concept of Gradient Descent and its role in optimizing machine learning models. (07)

Q.2 **(a)** Explain Linear Regression in detail. (07)

(b) Explain the concept of Boosting in Ensemble Learning? (07)

OR

(a) Describe the SVM algorithm and discuss its pros and cons. (07)

(b) Describe the concept of Decision Tree algorithm in Machine Learning. (07)

Q.3 **(a)** Explain the Confusion Matrix and why do you need it? (07)

(b) Explain Hierarchical clustering in detail. (07)

OR

(a) Explain K-Means clustering algorithms. (07)

(b) What is Dimensionality Reduction and explain Principal Component Analysis. (07)

Q.4 **(a)** Explain the single-layer feed forward architecture of ANN. (07)

(b) Use a simple perceptron with weights $w_0 = -1, w_1 = 2$, and $w_3 = 1$, to classify the data points $(3,4), (5,2), (1,-3), (-8,-3), (-3,0)$. (07)

OR

(a) Explain the basic structure of a multi-layer perceptron. Explain how it can solve the XOR problem. (07)

(b) Explain, in detail, the backpropagation algorithm. (07)

Q.5 Attempt any **SEVEN** out of **TWELVE:** (14)

(1) What are outliers?

(2) Explain Precision and Recall.

(3) Describe Model evaluation metrics for Regression.

(4) Why dimension reduction is important?

(5) Describe an entropy in Decision Tree.

(6) Describe Bagging.
(7) What is the difference between Co-relation and Covariance.
(8) What is a linearly inseparable problem?
(9) What are the constraints of a simple perceptron?
(10) What is the difference of step function with threshold function?
(11) What is the function of a summation junction of a neuron?
(12) Describe Boosting.

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