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SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

FIFTH SEMESTER B.TECH DEGREE EXAMINATION (Regular), DECEMBER 2022

(2020 SCHEME)

Course Code : 20CST383

Course Name: Concepts In Machine Learning

Max. Marks : 100 **Duration: 3 Hours**

PART A

(Answer all questions. Each question carries 3 marks)

1. Distinguish between Supervised, Unsupervised and Reinforcement Learning.
2. Explain how do you calculate the maximum likelihood estimates of the parameter values of the any distribution?
3. What is overfitting? How can overfitting be prevented?
4. Explain the use of activation function in a neural network.
5. Illustrate the maximum margin classifier in SVM model.
6. Explain the components in multilayer feed forward neural network.
7. Demonstrate the expectation maximization algorithm with examples.
8. Explain dimensionality reduction with example.
9. Find out Precision and recall for the following data set.
   Consider a dataset with a 1:100 minority to majority ratio, with 100 minority examples and 10,000 majority class examples.
   A model makes predictions and predicts 120 examples as belonging to the minority class, 90 of which are correct, and 30 of which are incorrect.
10. Explain bias and variance with suitable example.

PART B

(Answer one full question from each module, each question carries 14 marks)

MODULE I

11. a) What is supervised and unsupervised training. Explain with suitable examples. (7)
    b) Illustrate the major steps in MLE with examples. (7)

OR

12. a) Explain Maximum Aposteriori Estimation with example (7)
    b) A man is known to speak the truth 2 out of 3 times. He throws a die and reports that the number obtained is a four. Find the probability that the number obtained is actually a four. (7)

MODULE II

13. a) Explain Linear Regression with one Variable using least squares. (7)
    b) What are the basic components of Perceptron? Explain its working with neat diagram. (7)

OR

14. a) Derive Naive Bayes Theorem. (5)
    b) Consider a dataset based on which determine whether to play football not using the ID3 algorithm. (9)

Outlook	Temperature	Humidity	Wind	Play foot ball
Sunny	Hot	High	Weak	No
Sunny	Hot	High	Strong	No
Overcast	Hot	High	Weak	Yes
Rain	Mild	High	Weak	Yes
Rain	Cool	Normal	Weak	Yes
Rain	Cool	Normal	Strong	No
Overcast	Cool	Normal	Strong	Yes
Sunny	Mild	High	Weak	No
Sunny	Cool	Normal	Weak	Yes
Rain	Mild	Normal	Weak	Yes
Sunny	Mild	Normal	Strong	Yes
Overcast	Mild	High	Strong	Yes
Overcast	Hot	Normal	Weak	Yes
Rain	Mild	High	Strong	No

MODULE III

15. a) Explain about various layers used in Backpropagation Algorithm with neat diagram. (7)
    b) Illustrate how Maximum Margin Classifier is used in SVM. (7)

OR

16. a) How to minimize the number of misclassification errors using Soft Margin SVM Classifier? Explain in detail. (7)
    b) How do Kernels Learn Non-Linear Functions? Explain the steps in detail. (7)

MODULE IV

17. a) How Agglomerative Hierarchical clustering works? Explain the procedure to measure distance between two clusters. (7)
    b) Explain K-Means Clustering algorithm with example. (7)

OR

18. a) What is Principal Component Analysis? Explain the steps in PCA. (7)
    b) How Linear Discriminant Analysis (LDA) works? Explain the LDA model with example. (7)

MODULE V

19. a) Explain any three classification Performance Measures with example. (7)
    b) Describe the different types of Ensemble Classifier. (7)

OR

20. a) Explain about Bias-Variance Decomposition. (7)
    b) Develop a Classifier for Email spam detection model. (7)

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