Decision Tree

Assignment Questions

Theoretical

1. What is a Decision Tree, and how does it work?
2. What are impurity measures in Decision Trees?
3. What is the mathematical formula for Gini Impurity?
4. What is the mathematical formula for Entropy?
5. What is Information Gain, and how is it used in Decision Trees?
6. What is the difference between Gini Impurity and Entropy?
7. What is the mathematical explanation behind Decision Trees?
8. What is Pre-Pruning in Decision Trees?
9. What is Post-Pruning in Decision Trees?
10. What is the difference between Pre-Pruning and Post-Pruning?
11. What is a Decision Tree Regressor?
12. What are the advantages and disadvantages of Decision Trees?
13. How does a Decision Tree handle missing values?
14. How does a Decision Tree handle categorical features?
15. What are some real-world applications of Decision Trees?

Practical

16. Write a Python program to train a Decision Tree Classifier on the Iris dataset and print the model accuracy.
17. Write a Python program to train a Decision Tree Classifier using Gini Impurity as the criterion and print the feature importances.
18. Write a Python program to train a Decision Tree Classifier using Entropy as the splitting criterion and print the model accuracy.
19. Write a Python program to train a Decision Tree Regressor on a housing dataset and evaluate using Mean Squared Error (MSE).
20. Write a Python program to train a Decision Tree Classifier and visualize the tree using graphviz.
21. Write a Python program to train a Decision Tree Classifier with a maximum depth of 3 and compare its accuracy with a fully grown tree.
22. Write a Python program to train a Decision Tree Classifier using min_samples_split=5 and compare its accuracy with a default tree.
23. Write a Python program to apply feature scaling before training a Decision Tree Classifier and compare its accuracy with unscaled data.
24. Write a Python program to train a Decision Tree Classifier using One-vs-Rest (OvR) strategy for multiclass classification.
25. Write a Python program to train a Decision Tree Classifier and display the feature importance scores.
26. Write a Python program to train a Decision Tree Regressor with max_depth=5 and compare its performance with an unrestricted tree.
27. Write a Python program to train a Decision Tree Classifier, apply Cost Complexity Pruning (CCP), and visualize its effect on accuracy.
28. Write a Python program to train a Decision Tree Classifier and evaluate its performance using Precision, Recall, and F1-Score.
29. Write a Python program to train a Decision Tree Classifier and visualize the confusion matrix using seaborn.
30. Write a Python program to train a Decision Tree Classifier and use GridSearchCV to find the optimal values for max_depth and min_samples_split.