Boosting Techniques

Assignment Questions

Theoretical

1. What is Boosting in Machine Learning?
2. How does Boosting differ from Bagging?
3. What is the key idea behind AdaBoost?
4. Explain the working of AdaBoost with an example.
5. What is Gradient Boosting, and how is it different from AdaBoost?
6. What is the loss function in Gradient Boosting?
7. How does XGBoost improve over traditional Gradient Boosting?
8. What is the difference between XGBoost and CatBoost?
9. What are some real-world applications of Boosting techniques?
10. How does regularization help in XGBoost?
11. What are some hyperparameters to tune in Gradient Boosting models?
12. What is the concept of Feature Importance in Boosting?
13. Why is CatBoost efficient for categorical data?

Practical

14. Train an AdaBoost Classifier on a sample dataset and print model accuracy.
15. Train an AdaBoost Regressor and evaluate performance using Mean Absolute Error (MAE).
16. Train a Gradient Boosting Classifier on the Breast Cancer dataset and print feature importance.
17. Train a Gradient Boosting Regressor and evaluate using R-Squared Score.
18. Train an XGBoost Classifier on a dataset and compare accuracy with Gradient Boosting.
19. Train a CatBoost Classifier and evaluate using F1-Score.
20. Train an XGBoost Regressor and evaluate using Mean Squared Error (MSE).
21. Train an AdaBoost Classifier and visualize feature importance.
22. Train a Gradient Boosting Regressor and plot learning curves.
23. Train an XGBoost Classifier and visualize feature importance.
24. Train a CatBoost Classifier and plot the confusion matrix.
25. Train an AdaBoost Classifier with different numbers of estimators and compare accuracy.
26. Train a Gradient Boosting Classifier and visualize the ROC curve.
27. Train an XGBoost Regressor and tune the learning rate using GridSearchCV.
28. Train a CatBoost Classifier on an imbalanced dataset and compare performance with class weighting.
29. Train an AdaBoost Classifier and analyze the effect of different learning rates.
30. Train an XGBoost Classifier for multi-class classification and evaluate using log-loss.