SVM & Naive bayes

Assignment Questions

PW SKILLS

Theoretical

1. What is a Support Vector Machine (SVM)?
2. What is the difference between Hard Margin and Soft Margin SVM?
3. What is the mathematical intuition behind SVM?
4. What is the role of Lagrange Multipliers in SVM?
5. What are Support Vectors in SVM?
6. What is a Support Vector Classifier (SVC)?
7. What is a Support Vector Regressor (SVR)?
8. What is the Kernel Trick in SVM?
9. Compare Linear Kernel, Polynomial Kernel, and RBF Kernel.
10. What is the effect of the C parameter in SVM?
11. What is the role of the Gamma parameter in RBF Kernel SVM?
12. What is the Naïve Bayes classifier, and why is it called "Naïve"?
13. What is Bayes' Theorem?
14. Explain the differences between Gaussian Naïve Bayes, Multinomial Naïve Bayes, and Bernoulli Naïve Bayes.
15. When should you use Gaussian Naïve Bayes over other variants?
16. What are the key assumptions made by Naïve Bayes?
17. What are the advantages and disadvantages of Naïve Bayes?
18. Why is Naïve Bayes a good choice for text classification?
19. Compare SVM and Naïve Bayes for classification tasks.
20. How does Laplace Smoothing help in Naïve Bayes?

Practical

21. Write a Python program to train an SVM Classifier on the Iris dataset and evaluate accuracy.
22. Write a Python program to train two SVM classifiers with Linear and RBF kernels on the Wine dataset, then compare their accuracies.
23. Write a Python program to train an SVM Regressor (SVR) on a housing dataset and evaluate it using Mean Squared Error (MSE).
24. Write a Python program to train an SVM Classifier with a Polynomial Kernel and visualize the decision boundary.
25. Write a Python program to train a Gaussian Naïve Bayes classifier on the Breast Cancer dataset and evaluate accuracy.
26. Write a Python program to train a Multinomial Naïve Bayes classifier for text classification using the 20 Newsgroups dataset.

27. Write a Python program to train an SVM Classifier with different C values and compare the decision boundaries visually.
28. Write a Python program to train a Bernoulli Naïve Bayes classifier for binary classification on a dataset with binary features.
29. Write a Python program to apply feature scaling before training an SVM model and compare results with unscaled data.
30. Write a Python program to train a Gaussian Naïve Bayes model and compare the predictions before and after Laplace Smoothing.
31. Write a Python program to train an SVM Classifier and use GridSearchCV to tune the hyperparameters (C, gamma, kernel).
32. Write a Python program to train an SVM Classifier on an imbalanced dataset and apply class weighting and check it improve accuracy.
33. Write a Python program to implement a Naïve Bayes classifier for spam detection using email data.
34. Write a Python program to train an SVM Classifier and a Naïve Bayes Classifier on the same dataset and compare their accuracy.
35. Write a Python program to perform feature selection before training a Naïve Bayes classifier and compare results.
36. Write a Python program to train an SVM Classifier using One-vs-Rest (OvR) and One-vs-One (OvO) strategies on the Wine dataset and compare their accuracy.
37. Write a Python program to train an SVM Classifier using Linear, Polynomial, and RBF kernels on the Breast Cancer dataset and compare their accuracy.
38. Write a Python program to train an SVM Classifier using Stratified K-Fold Cross-Validation and compute the average accuracy.
39. Write a Python program to train a Naïve Bayes classifier using different prior probabilities and compare performance.
40. Write a Python program to perform Recursive Feature Elimination (RFE) before training an SVM Classifier and compare accuracy.
41. Write a Python program to train an SVM Classifier and evaluate its performance using Precision, Recall, and F1-Score instead of accuracy.
42. Write a Python program to train a Naïve Bayes Classifier and evaluate its performance using Log Loss (Cross-Entropy Loss).
43. Write a Python program to train an SVM Classifier and visualize the Confusion Matrix using seaborn.
44. Write a Python program to train an SVM Regressor (SVR) and evaluate its performance using Mean Absolute Error (MAE) instead of MSE.
45. Write a Python program to train a Naïve Bayes classifier and evaluate its performance using the ROC-AUC score.
46. Write a Python program to train an SVM Classifier and visualize the Precision-Recall Curve.