**Task 15**

Machine Learning (Model Evaluation and Selection II)

Upload the .py or .ipynb extension file to GitHub public repo “100DaysofBytewise" and share the link in the submission form by July 26, 2024.

##### **Dataset : Adult Income Dataset**

1. **Applying Cross-Validation to Random Forest Classifier**

* **Exercise:** Implement a random forest classifier and evaluate the model using k-fold cross-validation. Analyze the cross-validation scores to assess model stability.

1. **Investigating Overfitting and Underfitting in Gradient Boosting Machines**

* **Exercise:** Train a gradient boosting classifier with varying numbers of estimators and learning rates. Evaluate the model for overfitting and underfitting by comparing training and validation performance.

1. **Evaluating Precision, Recall, and F1-Score for Random Forests**

* **Exercise:** Implement a random forest classifier and calculate precision, recall, and F1-score. Discuss the trade-offs between these metrics and their importance for classification tasks.

1. **ROC Curve and AUC for Gradient Boosting Classifier**

* **Exercise:** Implement a gradient boosting classifier and plot the ROC curve. Compute the AUC and interpret how well the model distinguishes between classes.

1. **Model Performance Comparison with Different Metrics**

* **Exercise:** Compare the performance of different classifiers (e.g., SVM, random forest, gradient boosting) using cross-validation. Evaluate and compare the models based on accuracy, precision, recall, F1-score, and ROC-AUC.