**Task 15**

Machine Learning

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.