Machine Learning – Assignment 2

Bank Marketing Classification – End-to-End ML Deployment

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GitHub Repository Link

https://github.com/2025aa05599-WILP-Bits-Pilani/MachineLearning-Assignment-2.git

Live Streamlit Application Link

https://2025aa05599machinelearning-assignment-2-zemb2csvshwxvnbkvk8appj.streamlit.app/

Problem Statement

The objective of this assignment is to implement and compare multiple classification models on a real-world dataset. The models are evaluated using Accuracy, AUC, Precision, Recall, F1 Score, and Matthews Correlation Coefficient (MCC). The project is deployed as an interactive Streamlit web application.

Dataset Description

Dataset: Bank Marketing Dataset (UCI Repository)
Total Instances: 41,188
Total Features: 20 input features + 1 target variable
Target Variable: y (yes/no)

Models Implemented

1. Logistic Regression
2. Decision Tree Classifier
3. K-Nearest Neighbors
4. Naive Bayes (Gaussian)
5. Random Forest (Ensemble Model)
6. XGBoost (Ensemble Model)

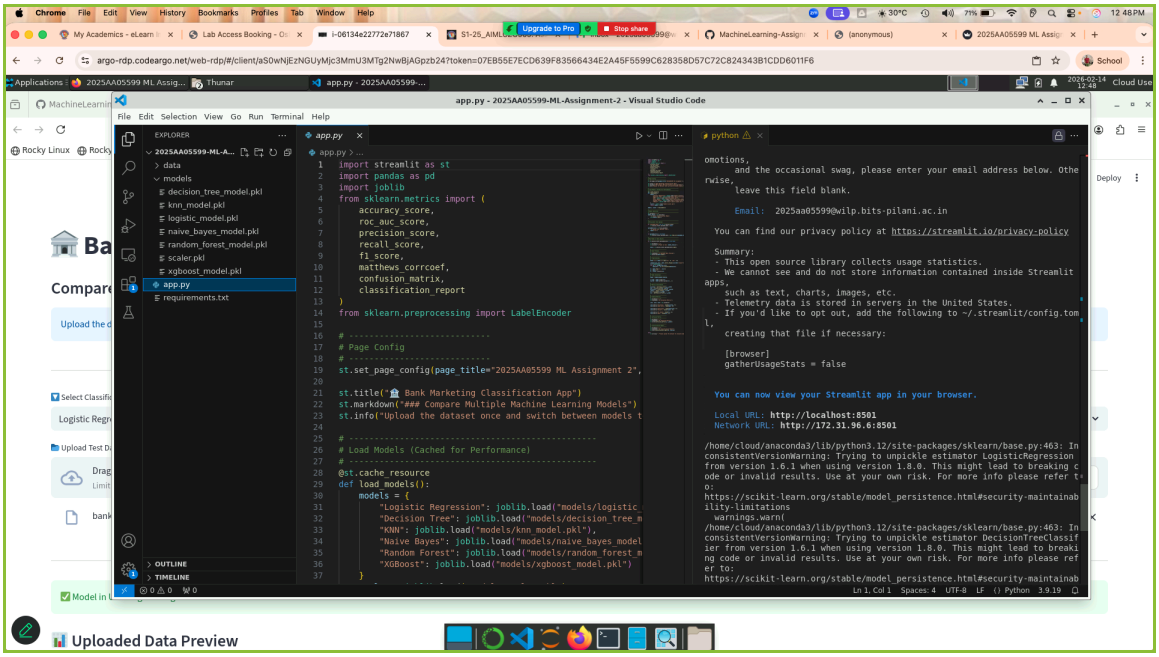
Table 1: Model Comparison

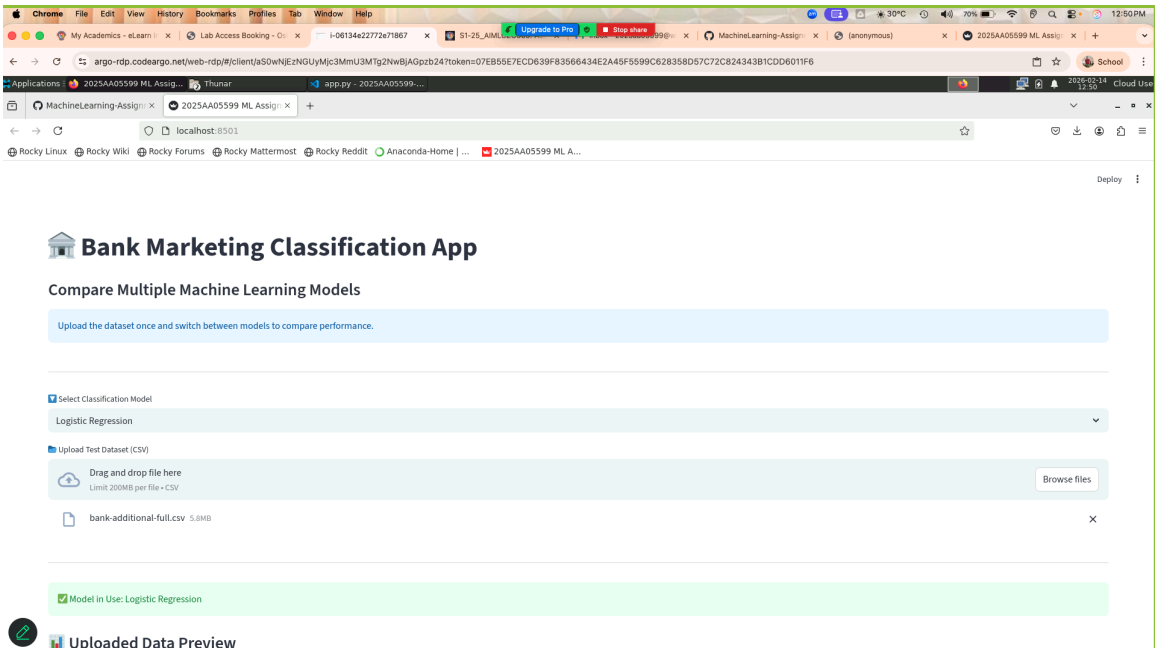
Model	Accuracy	AUC	Precision	Recall	F1	MCC
Logistic Regression	0.9139	0.9370	0.7001	0.4127	0.5193	0.4956
Decision Tree	0.9180	0.9334	0.6794	0.5161	0.5866	0.5484
KNN	0.9053	0.8616	0.6267	0.3943	0.4841	0.4491
Naive Bayes	0.8536	0.8606	0.4023	0.6174	0.4872	0.4189
Random Forest	0.9196	0.9521	0.7180	0.4719	0.5695	0.5414
XGBoost	0.9207	0.9543	0.6811	0.5571	0.6129	0.5728

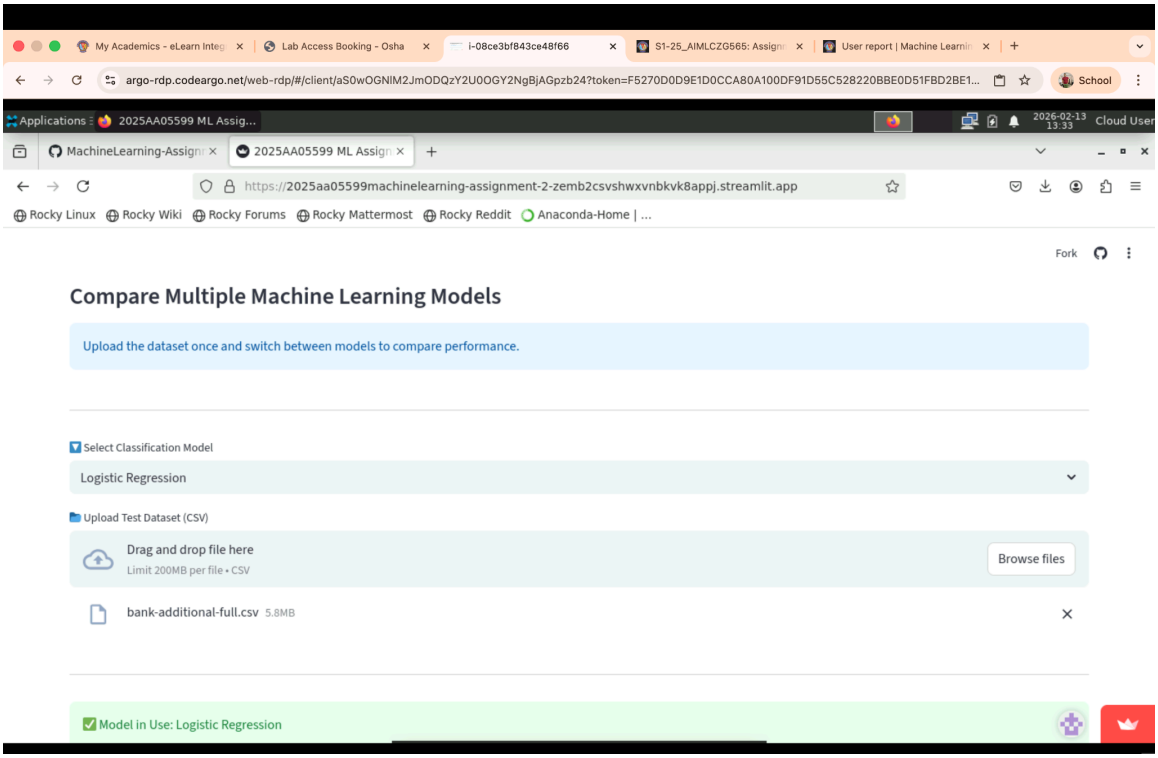
Table 2: Model Observations

Model	Observation
Logistic Regression	High AUC but lower recall for minority class.
Decision Tree	Improved recall compared to Logistic Regression.
KNN	Moderate performance with lower AUC.
Naive Bayes	High recall but low precision (more false positives).
Random Forest	Balanced precision and recall.
XGBoost	Best overall performance with highest AUC, F1 and MCC.

BITS Virtual Lab Screenshots






Compare Multiple Machine Learning Models
Upload the dataset once and switch between models to compare performance.
Select Classification Model
Logistic Regression
Upload Test Dataset (CSV)
Drag and drop file here
Limit 200MB per file • CSV
Browse files
bank-additional-full.csv 5.8MB
Model in Use: Logistic Regression