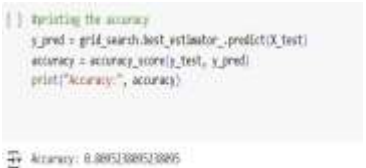
Model Optimization and Tuning Phase Template

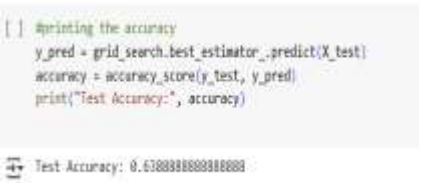
Date	18 June 2025
Team ID	SWTID1749880888
Project Title	Prosperity Prognosticator: Machine Learning for Startup Success Prediction
Maximum Marks	10 Marks

Model Optimization and Tuning Phase

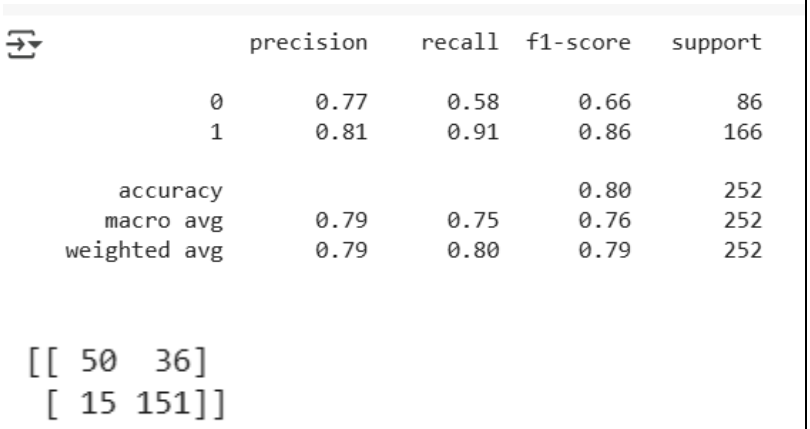
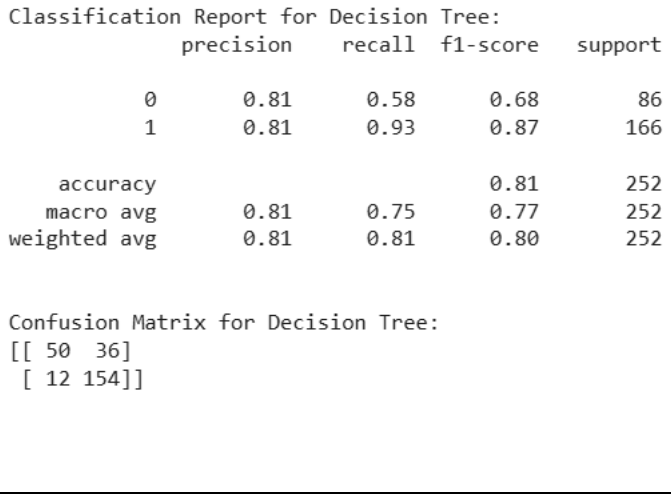
The Model Optimization and Tuning Phase involves refining machine learning models for peak performance. It includes optimized model code, fine-tuning hyperparameters, comparing performance metrics, and justifying the final model selection for enhanced predictive accuracy and efficiency.

Hyperparameter Tuning Documentation (6 Marks):

Model	Tuned Hyperparameters	Optimal Values
Random forest		
Decision tree		

Knn model		

Performance Metrics Comparison Report (2 Marks):

Model	Optimized Metric
Random forest	
Decision tree	

KNN model	Classification Report for KNN: precision recall f1-score support 0 0.46 0.36 0.41 86 1 0.70 0.78 0.74 166 accuracy 0.64 252 macro avg 0.58 0.57 0.57 252 weighted avg 0.62 0.64 0.63 252 Confusion Matrix for KNN: [[31 55] [36 130]]

Final Model Selection Justification (2 Marks):

Final Model	Reasoning
Random Forest	It provides high accuracy, handles both classification and regression well, and is robust to overfitting due to its ensemble nature. It also performs well on structured/tabular data and gives insight into feature importance, making it ideal for our startup success prediction task.