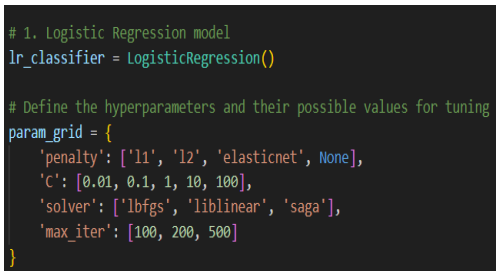
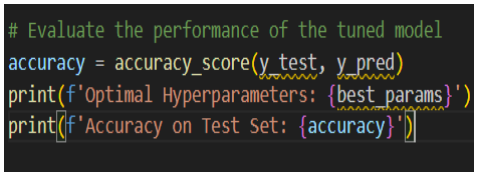
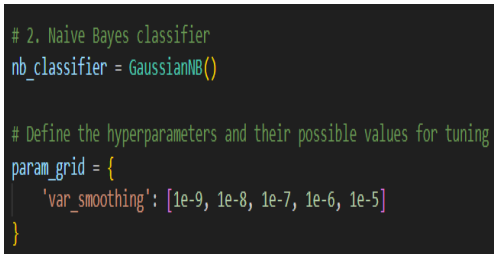
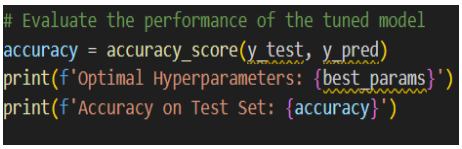
Model Optimization and Tuning Phase Report

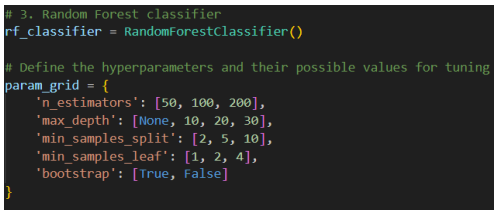
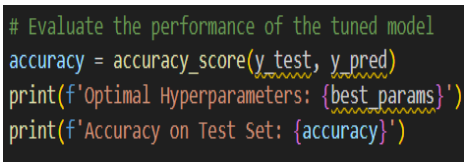
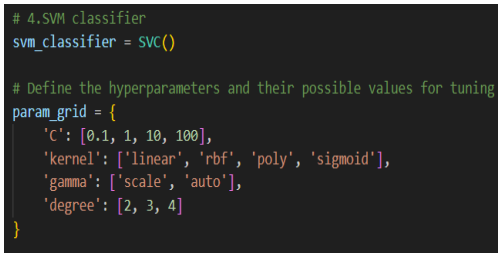
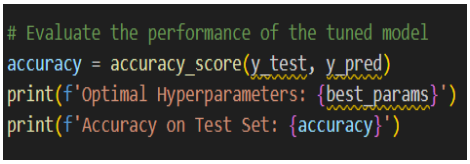
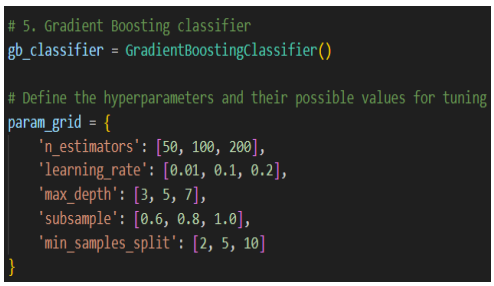
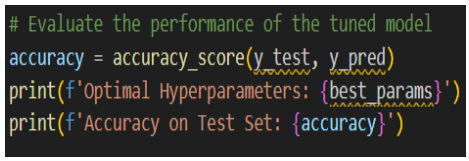
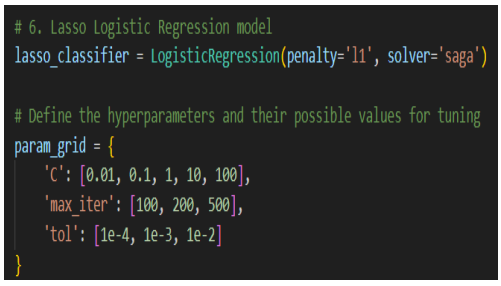
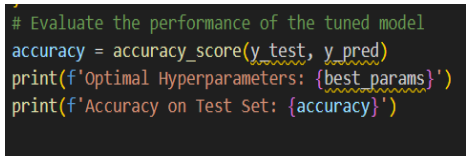
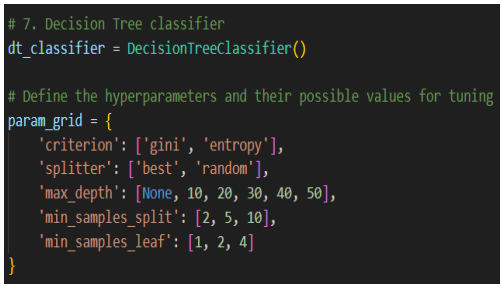
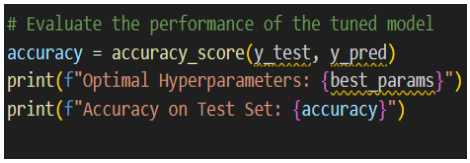
Date	16th June 2025
Team ID	SWTID1749621188
Project Title	Anemia Sense Leveraging-Machine Learning For-Precise Anemia Recognition
Maximum Marks	10 Marks

Model Optimization and Tuning Phase

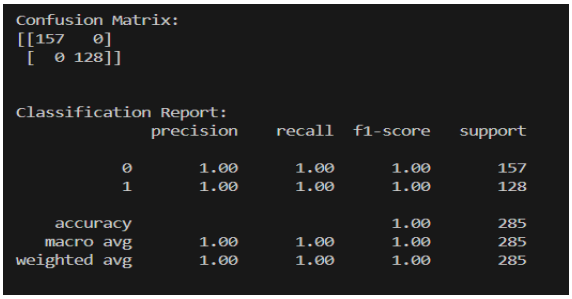
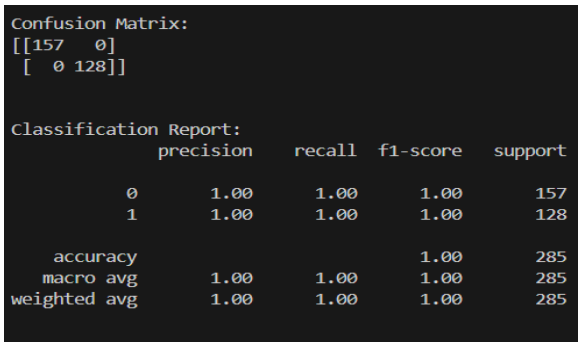
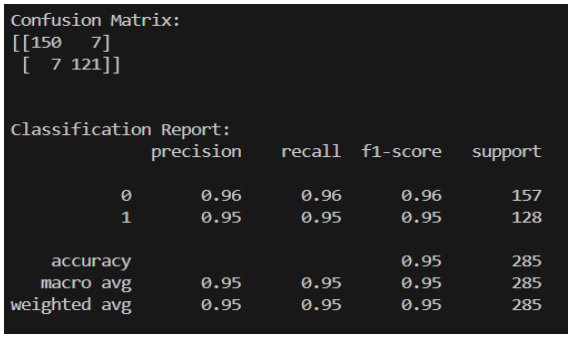
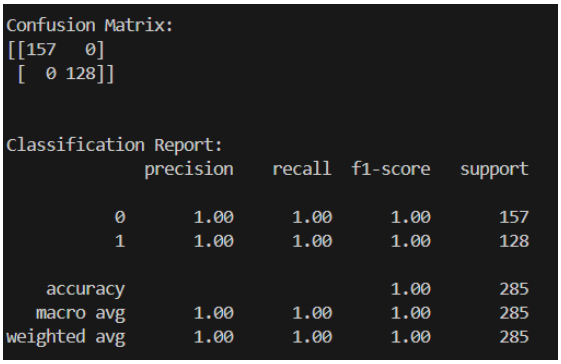
The Model Optimization and Tuning Phase involves refining machine learning models for peak performance. It includes optimized model code, fine-tuning hyperparameters, comparing performance metrics, and justifying the final model selection for enhanced predictive accuracy and efficiency.

Hyperparameter Tuning Documentation (6 Marks):

Model	Tuned Hyperparameters	Optimal Values
Logistic Regression		
Naïve Bayes		

Random Forest Classifier		
SVM		
Gradient Boosting		
Lasso		
Decision Tree Classifier		

Performance Metrics Comparison Report (2 Marks):

Model	Optimized Metric
Decision Tree	
Random Forest	
Naïve Bayes	
Gradient Boosting	

Logistic Regression	Confusion Matrix: [[154 3] [0 128]] Classification Report: precision recall f1-score support 0 1.00 0.98 0.99 157 1 0.98 1.00 0.99 128 accuracy 0.99 285 macro avg 0.99 0.99 0.99 285 weighted avg 0.99 0.99 0.99 285
SVM	Confusion Matrix: [[152 5] [0 128]] Classification Report: precision recall f1-score support 0 1.00 0.97 0.98 157 1 0.96 1.00 0.98 128 accuracy 0.98 285 macro avg 0.98 0.98 0.98 285 weighted avg 0.98 0.98 0.98 285
Lasso	Confusion Matrix: [[155 2] [0 128]] Classification Report: precision recall f1-score support 0 1.00 0.99 0.99 157 1 0.98 1.00 0.99 128 accuracy 0.99 285 macro avg 0.99 0.99 0.99 285 weighted avg 0.99 0.99 0.99 285

Final Model Selection Justification (2 Marks):

Final Model	Reasoning
Random Forest	The Random Forest model was selected for its superior performance, exhibiting high accuracy during hyperparameter tuning. Its ability to handle complex relationships, minimize overfitting, and optimize predictive accuracy aligns with project objectives, justifying its selection as the final model.