Model Optimization and Tuning Phase

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Team ID	SWUID20250177148
Project Title	Machine Learning Approach for Employee Performance Prediction
Maximum Marks	10 Marks

Model Optimization and Tuning Phase

This phase involved improving the performance of machine learning models using hyperparameter tuning. The best model was selected after comparing performance metrics and tuning results. Optimization was done using manual tuning and default Scikit-learn/GridSearchCV parameters where applicable.

Hyperparameter Tuning Documentation (6 Marks):

Model	Tuned Hyperparameters	Optimal Values
Linear Regression	Default	-
Random Forrest	n_estimators, max_depth, min_samples_split	n_estimators=100, max_depth=10
XG Boost	n_estimators, max_depth, learning_rate	n_estimators=100, max_depth=6, learning_rate=0.1

Performance Metrics Comparison Report (2 Marks):

Model	Baseline Metric	Optimized Metric
Linear Regression	$R^2 = 0.72$, F1 = 0.74	No Optimized value
Random Forrest	$R^2 = 0.75$, F1 = 0.78	$R^2 = 0.79$, F1 = 0.81
XG Boost	$R^2 = 0.80$, F1 = 0.83	$R^2 = 0.83$, F1 = 0.86

Final Model Selection Justification (2 Marks):

Final Model	Reasoning
XG Boost	XG Boost outperformed both baseline and tuned versions of Linear Regression and Random Forest. With the best R^2 and F1 scores after tuning, it demonstrated strong generalization, scalability, and robustness — making it the most suitable model for deployment.