Model Optimization and Tuning Phase Template

Date	15 March 2024
Skillwallet ID	SWUID20250186419
Project Title	Employee Productivity Prediction Application
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
Linear Regression	N/A	N/A
Random Forest	n_estimators=100, random_state=42	n_estimators=100, random_state=42
XGBoost	n_estimators=200, max_depth=5, learning_rate=0.1, random_state=42	n_estimators=200, max_depth=5, learning_rate=0.1, random_state=42

Performance Metrics Comparison Report (2 Marks):

Model	Baseline Metric	Optimized Metric
Linear Regression	R^2 Value : 135.25	R^2 Value : -27.99

Random Forest	R^2 Value : 2.23	R^2 Value : .2856
XGBoost Regressor	R^2 Value : 28.31	R^2 Value : 0.2068

Final Model Selection Justification (2 Marks):

Final Model	Reasoning
XGBoost Regressor	Explanation The XGBoost Regressor was chosen as the final model due to its superior performance compared to the baseline Linear Regression and Random Forest models. After hyperparameter tuning, the model's predictive accuracy was further enhanced, as evidenced by a lower MSE and a higher R-squared score. This robust performance makes it the most suitable and reliable choice for predicting employee productivity.