Model Optimization and Tuning Phase Template

Date	15 JULY 2024
Team ID	739681
Project Title	Car Performance Predicion
Maximum Marks	10 Marks

Model Optimization and Tuning Phase

The Model Optimization and Tuning Phase involves refining the predictive model for car performance by adjusting hyperparameters, selecting optimal algorithms, and applying techniques such as cross-validation. This phase ensures the model achieves high accuracy and generalizes well to new data by minimizing errors and avoiding overfitting, leading to improved predictive performance.

Hyperparameter Tuning Documentation (6 Marks):

Model	Tuned Hyperparameters	Optimal Values
Linear Regression		
	Regularization Parameter	0.01
Decision Tree	Maximum Depth Minimum Samples Split	10 5
Random Forest		
	Number of Trees Maximum Features	100 'sqrt'

Performance Metrics Comparison Report (2 Marks):

Model 2	Baseline value	Optimized value
Mean Absolute Error (MAE)	**0.35**	**028**
Root Mean Squared Error (RMSE)	**0.45**	**0.32**
R-squared (R^2)	**0.72**	**0.85**

Prediction Accuracy	**78%**	**88%**

Final Model Selection Justification (2 Marks):

FINAL MODEL	Reasoning
Random Forest Regressor	Robust to overfitting, handles both numerical and categorical data well, and provides feature importance insights.
Gradient Boosting Regressor	High accuracy through iterative improvement, effective in capturing complex relationships, and handles mixed data types.
Support Vector Regressor	Effective for high-dimensional spaces, versatile kernel functions to capture non-linear relationships, and robust to outliers.