Model Optimization and Tuning Phase Template

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Team ID	SWTID1720184497
Project Title	Cereal Analysis Based on Ratings by using Machine Learning Techniques
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
Ridge Regression	Alpha	1.0
Lasso Regression	Alpha	0.1
Decision Tree Regressor	Max Depth, Min Samples Split	10, 2

Random Forest Regressor	N_estimators, Max Depth, Min Samples Split	100, 10, 2

Performance Metrics Comparison Report (2 Marks):

Model	Baseline Metric	Optimized Metric
Linear Regression	R2: 0.933	R2: 0.933
Ridge Regression	R2: 0.9968	R2: 0.9968
Lasso Regression	R2: 0.933	R2: 0.933
Decision Tree Regressor	R2: 0.9966	R2: 0.9966
Random Forest Regressor	R2: 0.994	R2: 0.994

Final Model Selection Justification (2 Marks):

Final Model	Reasoning
Ridge Regression	The Ridge Regression model was chosen as the final optimized model because it exhibited the highest R-squared value (0.9968), indicating a strong fit to the data. Additionally, it had a lower RMSE (0.8339) and

	MAPE (1.8591%) compared to other models, suggesting superior predictive accuracy.