Model Optimization and Tuning Phase Template

Date	June 2025
Team ID	Team-739774
Project Title	Cereal analysis based on ratings by using mechine learning techniques
Maximum Marks	10 Marks

Model Optimization and Tuning Phase

The Model Optimization and Tuning Phase involves refining neural network 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 (8 Marks):

Model	Tuned Hyperparameters
Logistic Regression	`C = 1.0` (Regularization strength), `penalty = 'l2'`, `solver = 'liblinear'`
Linear Regression	No major hyperparameters to tune; used default settings.
Support Vector Machine (SVM)	`C = 0.5`, `kernel = 'linear'`, `gamma = 'scale'`
Random Forest Classifier	`n_estimators = 100`, `max_depth = 10`, `min_samples_split = 2`, `random_state = 42`
Naive Bayes (MultinomialNB)	`alpha = 0.1` (Smoothing parameter)

Final Model Selection Justification (2 Marks):

Final Model	Reasoning
Logistic Regression	Logistic Regression was selected due to its strong performance in classifying sentim (positive/negative) with high accuracy (~68%). It is simple, interpretable, and computationally efficient, making it suitable for text-based review analysis. Additionally, it outperformed other models like Naive Bayes and Linear Regression in terms of precision and F1-score