Model Optimization and Tuning Phase Template

Date	8 JULY 2024
Team ID	SWTID1720151909
Project Title	PANIC DISORDER DETECTION
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	--NO,Hyper Parameter Used--	--NA--
Ridge Regression	{'alpha': [0.1, 1.0, 10.0, 100.0]}	alpha: 1.0

Decision Tree Regressor	{'max_depth': [3, 5, 7, 10], 'min_samples_split': [2, 5, 10], 'min_samples_leaf': [1, 2, 4]}	max_depth: 7, min_samples_split: 2, min_samples_leaf: 1
Random Forest Regressor	-- NO HyperParameter used--	--NA--
XGBoost Regression	--No HyperParameter Used--	--NA--

Performance Metrics Comparison Report (2 Marks):

Model	Baseline Metric	Optimized Metric
Linear Regression	0.00024	0.00026 The test data doesn't fit well, showing underfitting.

Ridge Regression	0.00026	0.00024 The test data doesn't fit well, showing underfitting.
Decision Tree Regressor	0.75935	0.85651 The model shows overfitting as MSE of train data is less than test data.
Random Forest Regressor	0.324888	0.324888 The model shows overfitting compared to test data.

		Compared to test data,it gives Overfitting
XGBoost Regression	0.983078	0.983078 The model performs poorly on both training and test sets, showing underfitting.

Final Model Selection Justification (2 Marks):

Final Model	Reasoning
Random Forest Regressor	The Random Forest Regressor was chosen as the optimal model due to its superior performance in terms of Mean Squared Error (MSE) and R2 score when compared to other regression models. Despite showing some overfitting, it achieved the best balance between training and test set performance among all the models tested.