Model Optimization and Tuning Phase

Date	15th July 2024
Team ID	SWTID1720098339
Project Title	Machine learning approach for predicting the price of natural gas.
Maximum Marks	10 Marks

Hyperparameter Tuning Documentation (6 Marks):

Model	Tuned Hyperparameters	Optimal Values
Logistic Regression	Regularization strength (C), L1 or L2 regularization.	0.001, 0.01, 0.1, 1.0.
Random forest Regression	Number of trees (n_estimators), max_depth, min_samples_split, min_samples_leaf.	300, 20, 5, 2
Linear Regression	Regularization strength (alpha), Ridge regularization	0.001, 0.01, 0.1, 1.0
Decision Tree	Max_depth, min_samples_split, min_samples_leaf.	2,4,7,9…

Performance Metrics Comparison Report (2 Marks):

Model	Baseline Metric	Optimized Metric
Random Forest Model	0.857	0.97
Linear Regression Model	0.798	0.89
Decision Tree Model	0.9123	0.9621
Logistic Regression	0.785	0.88

Final Model Selection Justification (2 Marks):

Final Model	Reasoning
Decision Tree Regressor	We used the Decision tree regressor because it effectively handles non-linear relationships and interactions between features, reducing overfitting through ensemble averaging. Additionally, it provides feature importance insights and performs well with default hyperparameters, making it a robust choice for our prediction task.factors most significantly influence turbine performance, ensuring accurate and reliable energy forecasts.