Model Optimization and Tuning Phase

Date	12th July 2024
Team ID	SWTID1720449665
Project Title	Predicting The Energy Output Of Wind Turbine Based On Weather Condition
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
Random Forest Model	n_estimators, max_depth, max_leaf_nodes, and random_state	750, 4, 500, 1
Decision Tree Model	random_state	0

Performance Metrics Comparison Report (2 Marks):

Model	Baseline Metric	Optimized Metric
Random Forest Model	0.853	0.9123
Linear Regression Model	0.9064	0.9064
Decision Tree Model	0.8350	0.8350

Final Model Selection Justification (2 Marks):

Final Model	Reasoning
Random Forest Model	The Random Forest model was chosen as the final optimized model for your wind turbine energy prediction project due to its ensemble nature, which aggregates predictions from multiple decision trees. This approach mitigates overfitting, handles complex relationships between weather variables and energy output effectively, and provides robust predictions even in the presence of outliers. Additionally, its ability to highlight feature importance aids in understanding which weather factors most significantly influence turbine performance, ensuring accurate and reliable energy forecasts.