

Model Development Phase

Date	10 th July 2024
Team ID	SWTID1720449665
Project Title	Predicting The Energy Output Of Wind Turbine Based On Weather Condition
Maximum Marks	4 Marks

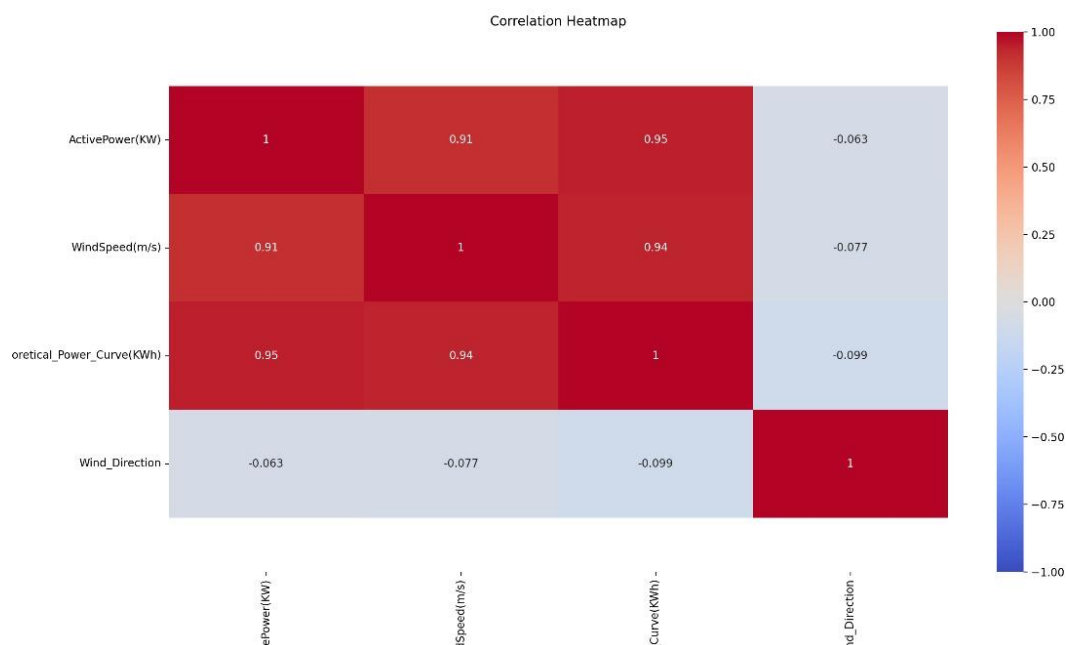
Initial Model Training Code, Model Validation and Evaluation Report

Initial Model Training Code:

```

# Function to train the model
def train_model(train_X, train_y):
    forest_model = RandomForestRegressor(n_estimators=750, max_depth=4, max_leaf_nodes=500, random_state=1)
    forest_model.fit(train_X, train_y)
    return forest_model
  
```

Random Forest Model, Correlation HeatMap:



Model Validation and Evaluation Report:

Model	Classification Report	Accuracy	Confusion Matrix																									
Random Forest Model	<div>Correlation Matrix:</div> <table><thead><tr><th></th><th>ActivePower(KW)</th><th>WindSpeed(m/s)</th><th>Theoretical_Power_Curve(KWh)</th><th>Wind_Direction</th></tr></thead><tbody><tr><td>ActivePower(KW)</td><td>1.000000</td><td>0.912774</td><td>0.949918</td><td>-0.062702</td></tr><tr><td>WindSpeed(m/s)</td><td>0.912774</td><td>1.000000</td><td>0.944209</td><td>-0.077188</td></tr><tr><td>Theoretical_Power_Curve(KWh)</td><td>0.949918</td><td>0.944209</td><td>1.000000</td><td>-0.099076</td></tr><tr><td>Wind_Direction</td><td>-0.062702</td><td>-0.077188</td><td>-0.099076</td><td>1.000000</td></tr></tbody></table> <div>Training Data Shapes: Features (train_X): (37897, 3) Target (train_y): (37897,)</div> <div>Validation Data Shapes: Features (val_X): (12633, 3) Target (val_y): (12633,)</div> <div>Random Forest Model Evaluation: Mean Absolute Error: 164.53113560922998 R^2 Score: 0.9131254350454864</div>		ActivePower(KW)	WindSpeed(m/s)	Theoretical_Power_Curve(KWh)	Wind_Direction	ActivePower(KW)	1.000000	0.912774	0.949918	-0.062702	WindSpeed(m/s)	0.912774	1.000000	0.944209	-0.077188	Theoretical_Power_Curve(KWh)	0.949918	0.944209	1.000000	-0.099076	Wind_Direction	-0.062702	-0.077188	-0.099076	1.000000	R^2=0.9131	
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Linear Regression Model	<div>Linear Regression Model Evaluation: Mean Absolute Error: 186.02138406078387 R^2 Score: 0.9064149237962988</div>	R^2=0.9064 1																										
Decision Tree Model	<div>Decision Tree Model Evaluation: Mean Absolute Error: 202.03636816879504 R^2 Score: 0.8350948643160179</div>	R^2=0.8350																										