Data Collection and Preprocessing Phase

Date	15 March 2024
Team ID	740063
Project Title	Predicting the energy output of wind turbine based on weather condition
Maximum Marks	6 Marks

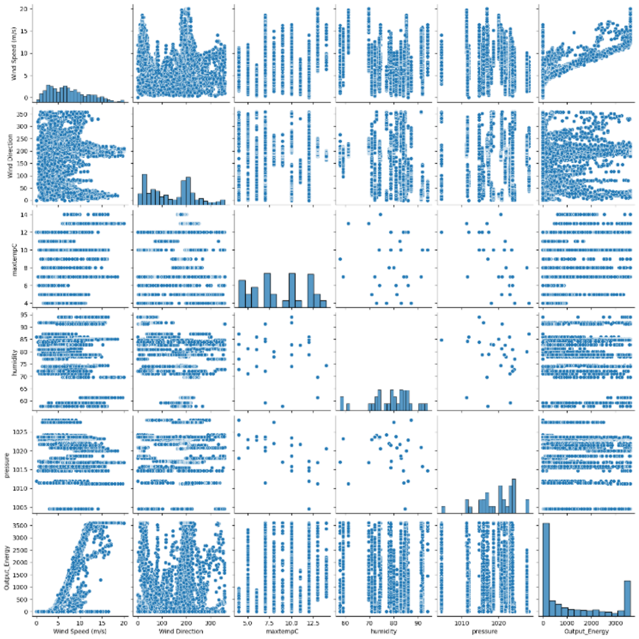
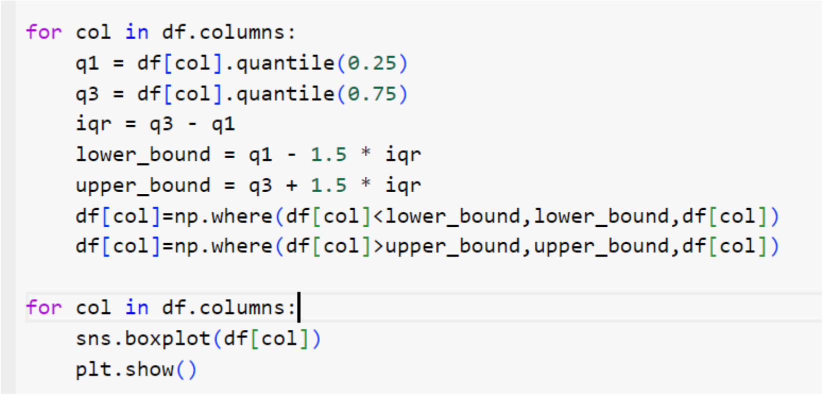
Data Exploration and Preprocessing Template

Identifies data sources, assesses quality issues like missing values and duplicates, and implements resolution plans to ensure accurate and reliable analysis.

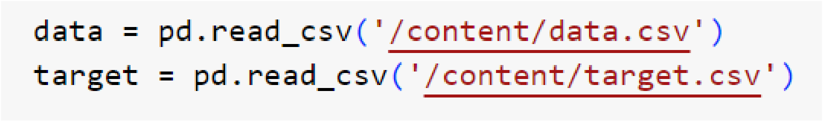
<table>
<tr><th>Section</th><th>Description</th></tr>
<tr><td>Data Overview</td><td>Basic statistics, dimensions, and structure of the data.
<pre>
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 4447 entries, 0 to 4446
Data columns (total 6 columns):
 #   Column   Non-Null Count Dtype
--- ------   -------------- -----
 0   Wind Speed (m/s)   4447 non-null   float64
 1   Wind Direction   4447 non-null   float64
 2   maxtempC   4447 non-null   int64
 3   humidity   4447 non-null   float64
 4   pressure   4447 non-null   float64
 5   Output_Energy   4447 non-null   float64
dtypes: float64(5), int64(1)
</pre></td></tr>
<tr><td>Univariate Analysis</td><td>Exploration of individual variables (mean, median, mode, etc.).
<table>
<tr><th>Wind Speed (m/s)</th><th>Wind Direction</th><th>maxtempC</th><th>humidity</th><th>pressure</th></tr>
</table></td></tr>
</table>

<table>
<tr>
<td></td>
<td>
<table>
<tr><td><b>count</b></td><td>4447.000000</td><td>4447.000000</td><td>4447.000000</td><td>4447.000000</td><td>4447.00000</td></tr>
<tr><td><b>mean</b></td><td>7.357389</td><td>140.667803</td><td>8.535192</td><td>78.648874</td><td>1019.49165</td></tr>
<tr><td><b>std</b></td><td>4.361162</td><td>93.616266</td><td>3.034301</td><td>9.004574</td><td>5.154328</td></tr>
<tr><td><b>min</b></td><td>0.000000</td><td>0.000000</td><td>4.000000</td><td>54.125000</td><td>1004.54166</td></tr>
<tr><td><b>25%</b></td><td>3.669025</td><td>53.272396</td><td>6.000000</td><td>74.000000</td><td>1015.87500</td></tr>
<tr><td><b>50%</b></td><td>6.717962</td><td>143.424896</td><td>8.000000</td><td>80.041667</td><td>1020.83333</td></tr>
<tr><td><b>75%</b></td><td>10.197950</td><td>206.816154</td><td>12.000000</td><td>84.708333</td><td>1023.45833</td></tr>
<tr><td><b>max</b></td><td>21.621000</td><td>359.942291</td><td>14.000000</td><td>93.958333</td><td>1028.20833</td></tr>
</table>
</td>
</tr>
<tr>
<td>Bivariate Analysis</td>
<td>
Relationships between two variables (correlation, scatter plots).
<table>
<tr><th></th><th>Wind Speed (m/s)</th><th>Wind Direction</th><th>maxtempC</th><th>humidity</th><th>pressu</th></tr>
<tr><td><b>Wind Speed (m/s)</b></td><td>1.000000</td><td>0.017336</td><td>0.339107</td><td>0.15185</td><td></td></tr>
<tr><td><b>Wind Direction</b></td><td>0.017336</td><td>1.000000</td><td>0.080762</td><td>0.31354</td><td></td></tr>
<tr><td><b>maxtempC</b></td><td>0.339107</td><td>0.080762</td><td>1.000000</td><td>0.06532</td><td></td></tr>
<tr><td><b>humidity</b></td><td>-0.151853</td><td>-0.313542</td><td>-0.065329</td><td>1.00000</td><td></td></tr>
<tr><td><b>pressure</b></td><td>-0.234967</td><td>-0.020962</td><td>-0.597324</td><td>0.12929</td><td></td></tr>
<tr><td><b>Output_Ener</b></td><td>0.882457</td><td>0.122913</td><td>0.403382</td><td></td><td></td></tr>
</table>
</td>
</tr>
</table>

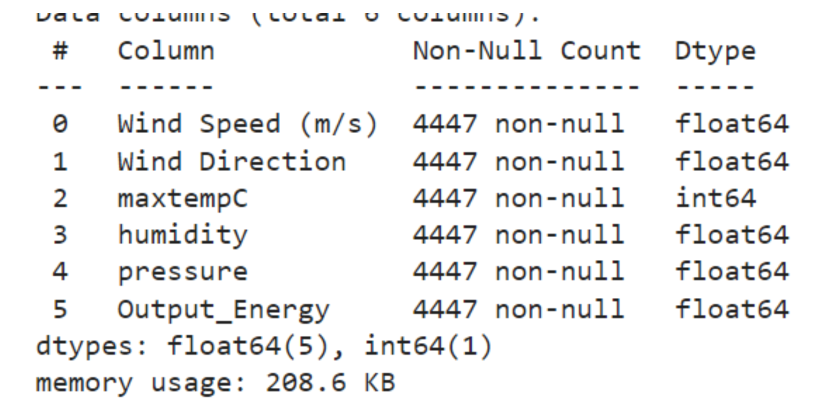
<table>
<tr><td></td><td><b>gy</b> 0.251067</td></tr>
<tr><td>Multivariate Analysis</td><td>Patterns and relationships involving multiple variables.


</td></tr>
<tr><td>Outliers and Anomalies</td><td>

```
for col in df.columns:
    q1 = df[col].quantile(0.25)
    q3 = df[col].quantile(0.75)
    iqr = q3 - q1
    lower_bound = q1 - 1.5 * iqr
    upper_bound = q3 + 1.5 * iqr
    df[col]=np.where(df[col]<lower_bound,lower_bound,df[col])
    df[col]=np.where(df[col]>upper_bound,upper_bound,df[col])

for col in df.columns:
    sns.boxplot(df[col])
    plt.show()
```
</td></tr>
<tr><td colspan="2"><b>Data Preprocessing Code Screenshots</b></td></tr>
<tr><td>Loading Data</td><td>

```
data = pd.read_csv('/content/data.csv')
target = pd.read_csv('/content/target.csv')
```
</td></tr>
</table>

Handling Missing Data	
	`Data columns (total 6 columns):`
	` #   Column            Non-Null Count  Dtype  `
	`---  ------            --------------  -----  `
	` 0   Wind Speed (m/s)  4447 non-null   float64`
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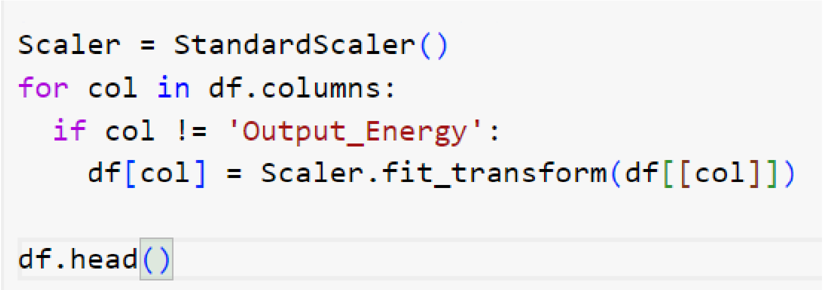
	` 4   pressure          4447 non-null   float64`
	` 5   Output_Energy     4447 non-null   float64`
	`dtypes: float64(5), int64(1)`
	`memory usage: 208.6 KB`

Data Transformation	
	`Scaler = StandardScaler()`
	`for col in df.columns:`
	`  if col != 'Output_Energy':`
	`    df[col] = Scaler.fit_transform(df[[col]])`
	
	`df.head()`

Feature Engineering	Code for creating new features or modifying existing ones.
Save Processed Data	Code to save the cleaned and processed data for future use. df = data