

MEASURE ENERGY CONSUMPTION

INTRODUCTION:

The Energy Consumption Data Analysis and Visualization program is designed for the analysis and visualization of energy consumption data. This program processes and visualizes data from multiple sources, enabling insights into energy consumption patterns and trends.

DATA SOURCES:

The program loads energy consumption data from various CSV files, each representing hourly energy consumption for different regions and times.

DATA ANALYSIS:

1. Data Merging:

- a. The program combines data from multiple sources, eliminating duplicate columns and ensuring data consistency.

2. Data Preprocessing:

- a. It converts the 'Datetime' column to a datetime format and handles missing values, preparing the data for analysis.

VISUALIZATION:

The program offers the following visualization tools:

1. Line Plot:

- a. Displays energy consumption (MW) over time, providing insights into consumption trends.

2. Scatter Plot:

- a. Depicts the relationship between 'PJM_Load' and 'PJM_Load_MW,' helping identify patterns or correlations.

3. Histogram:

- a. Shows the distribution of energy consumption (AEP_MW), offering a frequency-based view of consumption levels.

PROGRAM:

```
import pandas as pd
```

```
import matplotlib.pyplot as plt
```

```
dataset_filenames = [
```

```
    'AEP_hourly.csv', 'COMED_hourly.csv', 'DAYTON_hourly.csv', 'DEOK_hourly.csv',
```

```
    'DOM_hourly.csv', 'DUQ_hourly.csv', 'EKPC_hourly.csv', 'FE_hourly.csv', 'NI_hourly.csv',
```

```
    'pjm_hourly_est.csv', 'PJM_Load_hourly.csv', 'PJME_hourly.csv', 'PJM_W_hourly.csv'
```

```
]
```

```
datasets = []

for dataset_filename in dataset_filenames:
    data = pd.read_csv(dataset_filename)
    datasets.append(data)

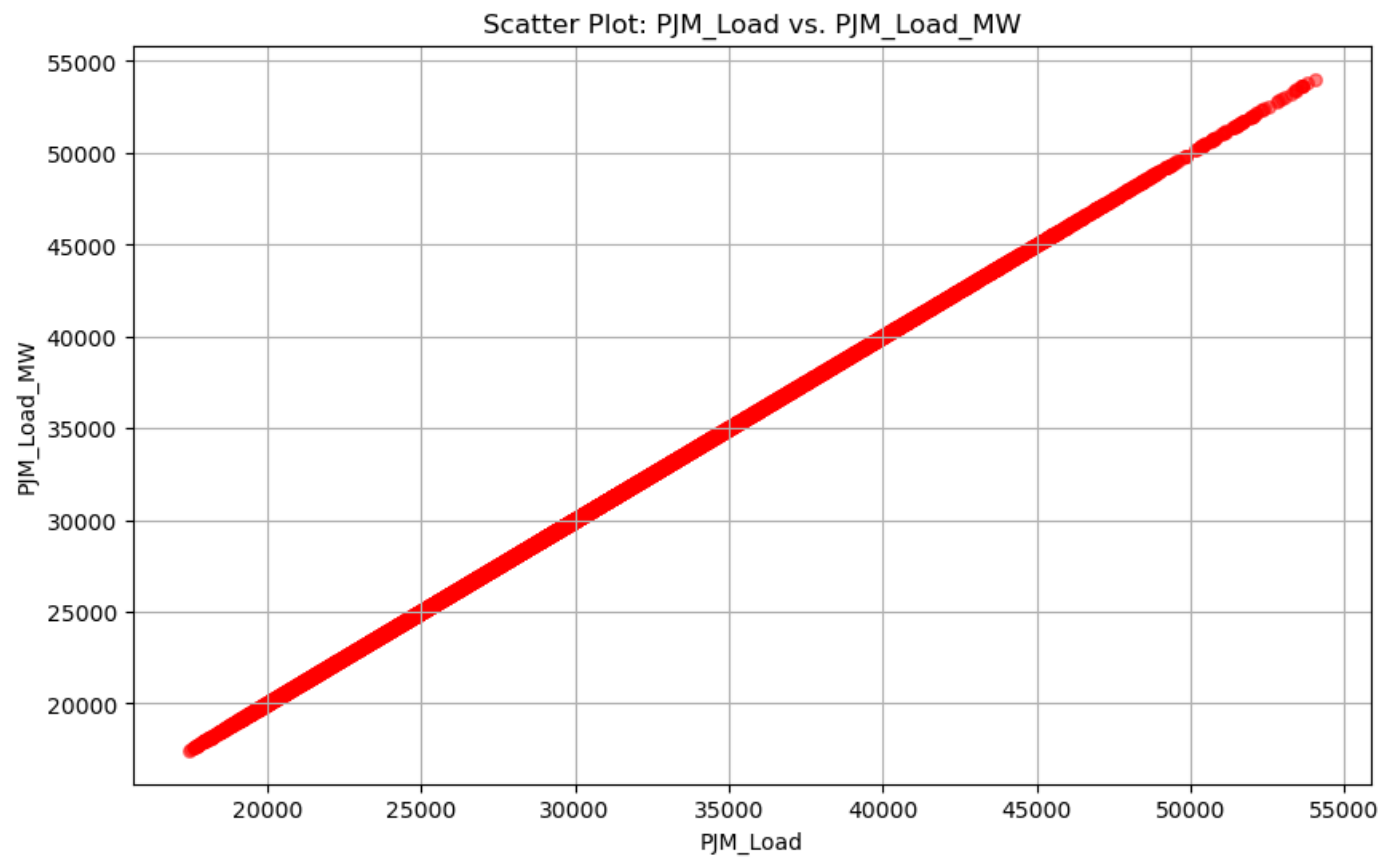
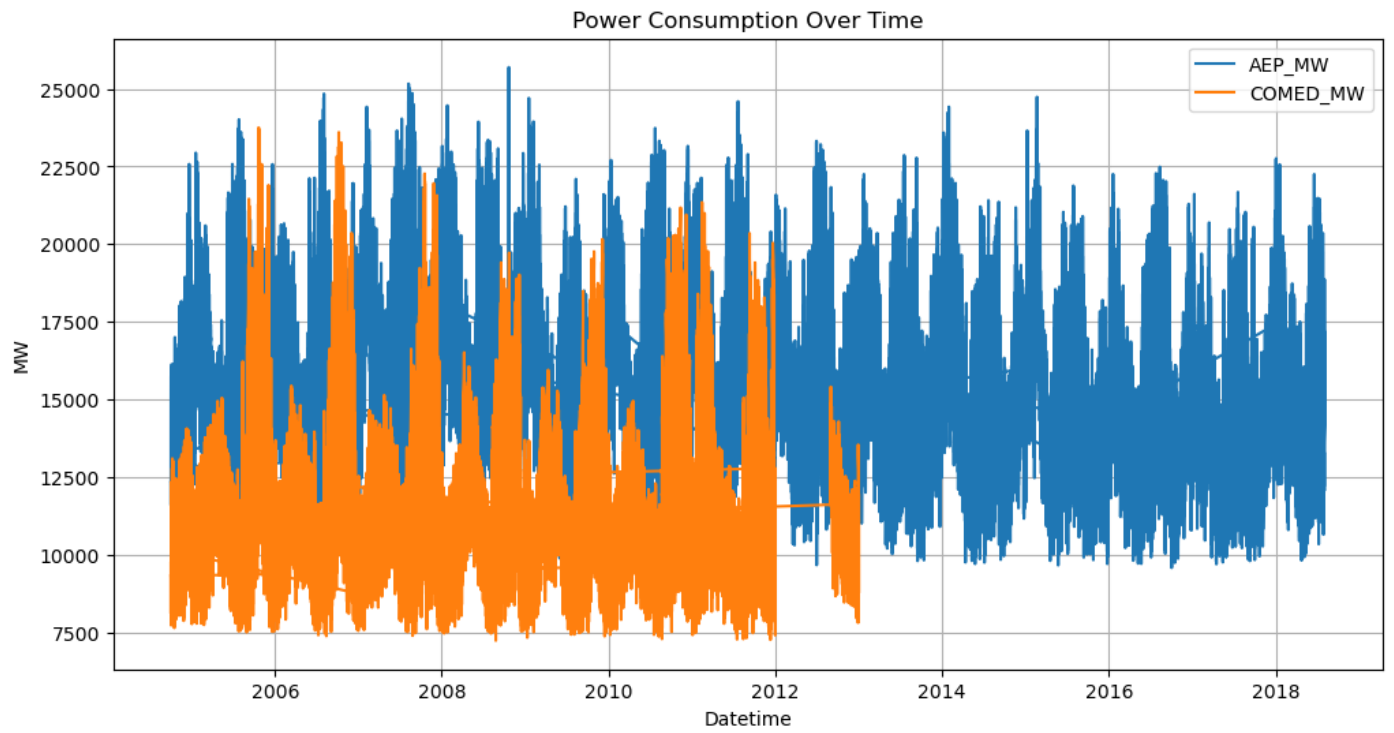
merged_dataset = pd.concat(datasets, axis=1)
merged_dataset = merged_dataset.loc[:, ~merged_dataset.columns.duplicated()]
merged_dataset = merged_dataset.dropna(subset=['Datetime'])
merged_dataset['Datetime'] = pd.to_datetime(merged_dataset['Datetime'])

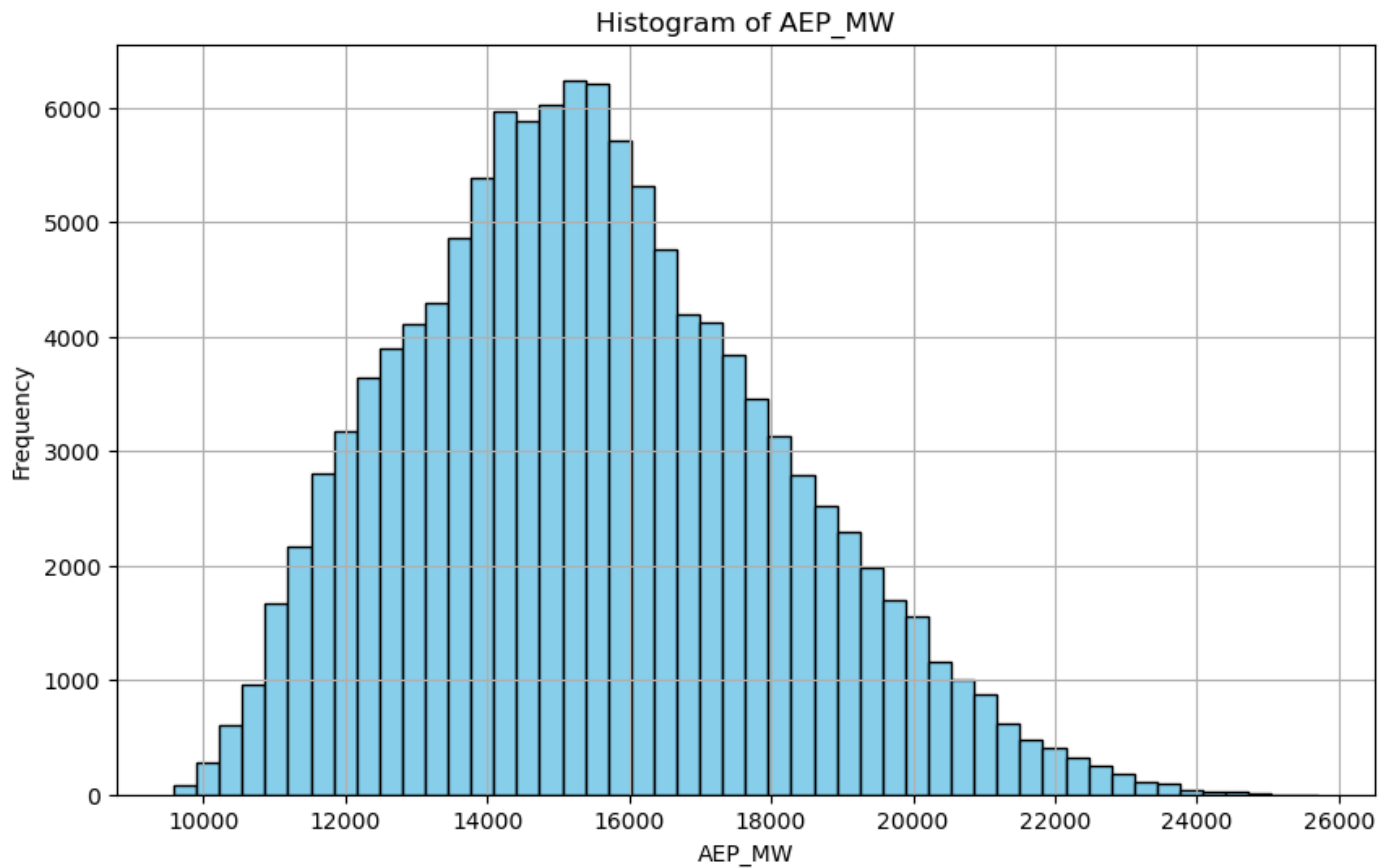
plt.figure(figsize=(12, 6))
plt.plot(merged_dataset['Datetime'], merged_dataset['AEP_MW'], label='AEP_MW')
plt.plot(merged_dataset['Datetime'], merged_dataset['COMED_MW'], label='COMED_MW')
plt.xlabel('Datetime')
plt.ylabel('MW')
plt.legend()
plt.title('Power Consumption Over Time')
plt.grid(True)
plt.show()

plt.figure(figsize=(10, 6))
plt.scatter(merged_dataset['PJM_Load'], merged_dataset['PJM_Load_MW'], s=30, alpha=0.5,
            marker='o', color='red')
plt.xlabel('PJM_Load')
plt.ylabel('PJM_Load_MW')
plt.title('Scatter Plot: PJM_Load vs. PJM_Load_MW')
plt.grid(True)
plt.show()

plt.figure(figsize=(10, 6))
plt.hist(merged_dataset['AEP_MW'], bins=50, color='skyblue', edgecolor='black')
plt.xlabel('AEP_MW')
plt.ylabel('Frequency')
plt.title('Histogram of AEP_MW')
plt.grid(True)
plt.show()
```

OUTPUT:





USAGE:

To use the program, ensure you have the necessary libraries installed, such as pandas and matplotlib. Customize the program as needed to include additional plots or perform specific data analysis.

CONCLUSION:

The Energy Consumption Data Analysis and Visualization program serves as a valuable tool for energy professionals and analysts. It allows for the exploration of historical data, trend identification, and data-informed decision-making in energy management.