Team MetaMinds
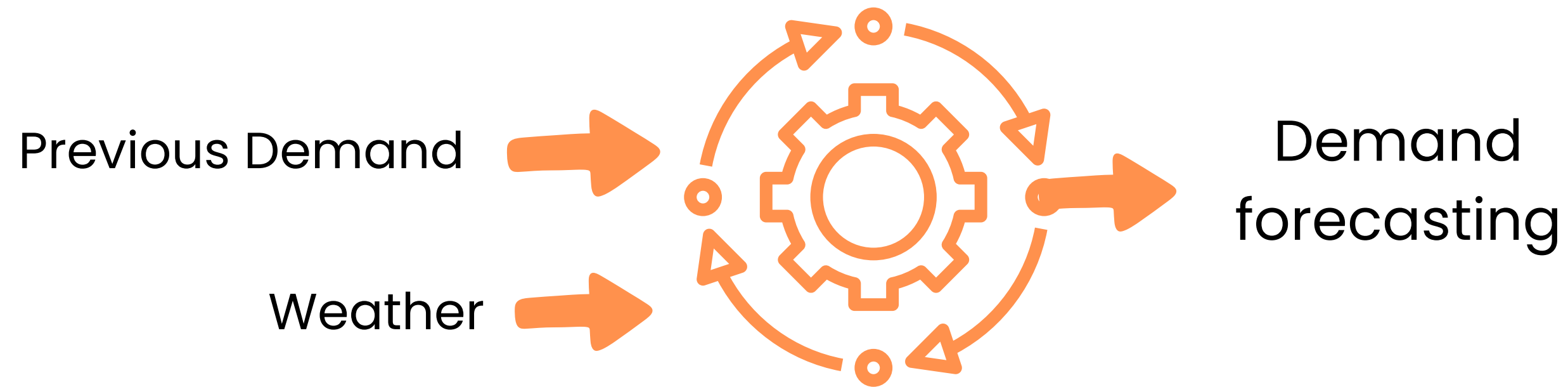
Category: Energy Forecasting

Amrit Baral
Nadika Poudel
Nirajan Bekoju
Nishant Luitel

Problem Statement

Previous Demand →

Weather →

→ Demand forecasting

Previous Prices →

→ Price forecasting

Data Exploration

Demand Forecasting Demand Data

- 27552 entries
- till 2/21/2023

Demand Forecasting Weather Data

- 27720 entries
- till 2/28/2023
- Lots of missing values

Price Forecasting data
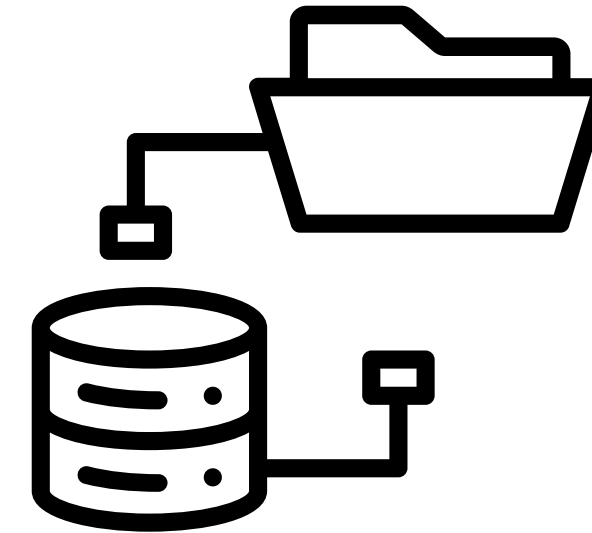
- 35352 entries
- till 12/24/2023
- 456 sample null

All data starting from 1/1/2020 0:00

Data Cleaning

- 5 columns in demand weather data (Unnamed: 21 ... Unnamed : 25)removed, NULL Data removed
- 456 sample NULL removed from the Price Forecasting data

Dataset Formation

- OUTER JOIN of Demand Data and Weather Data on datetime field

Exploratory Data Analysis

Descriptive Statistics

	Prices\n(EUR/MWh)	Demand (MW)	Temperature	feelslike	dewpoint	humidity	precipitation
count	34899.000000	27555.000000	27720.000000	27720.000000	27720.000000	27720.000000	27720.000000
mean	132.955080	551.811787	56.846847	55.505018	45.486089	68.485757	0.005618
std	120.246525	114.435250	18.734390	21.558142	18.198644	18.189507	0.044799
min	-35.000000	320.000000	-5.900000	-30.100000	-14.900000	17.100000	0.000000
25%	47.985000	474.500000	42.200000	38.000000	29.900000	55.172500	0.000000
50%	95.440000	529.500000	56.900000	56.900000	46.100000	70.540000	0.000000
75%	179.245000	601.900000	72.000000	72.000000	62.100000	83.960000	0.000000
max	1047.100000	1020.200000	99.000000	110.400000	79.100000	100.000000	2.376000

Distribution Plot

Distribution of Demand (MW)

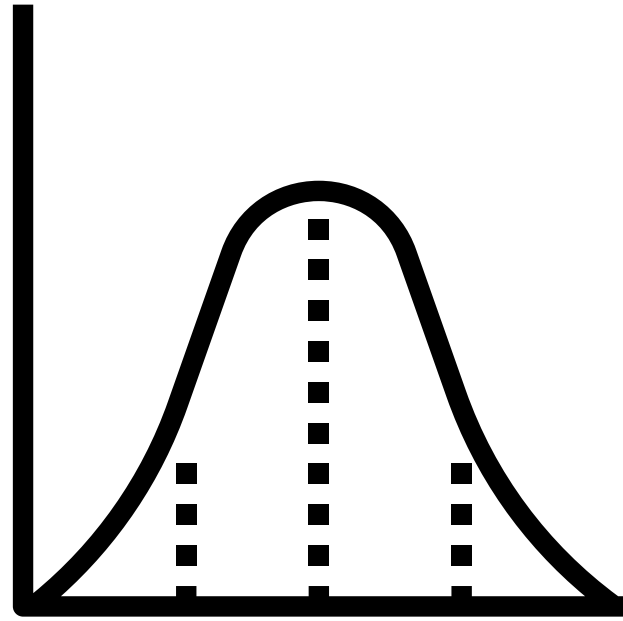Distribution of Prices (EUR/MWh)
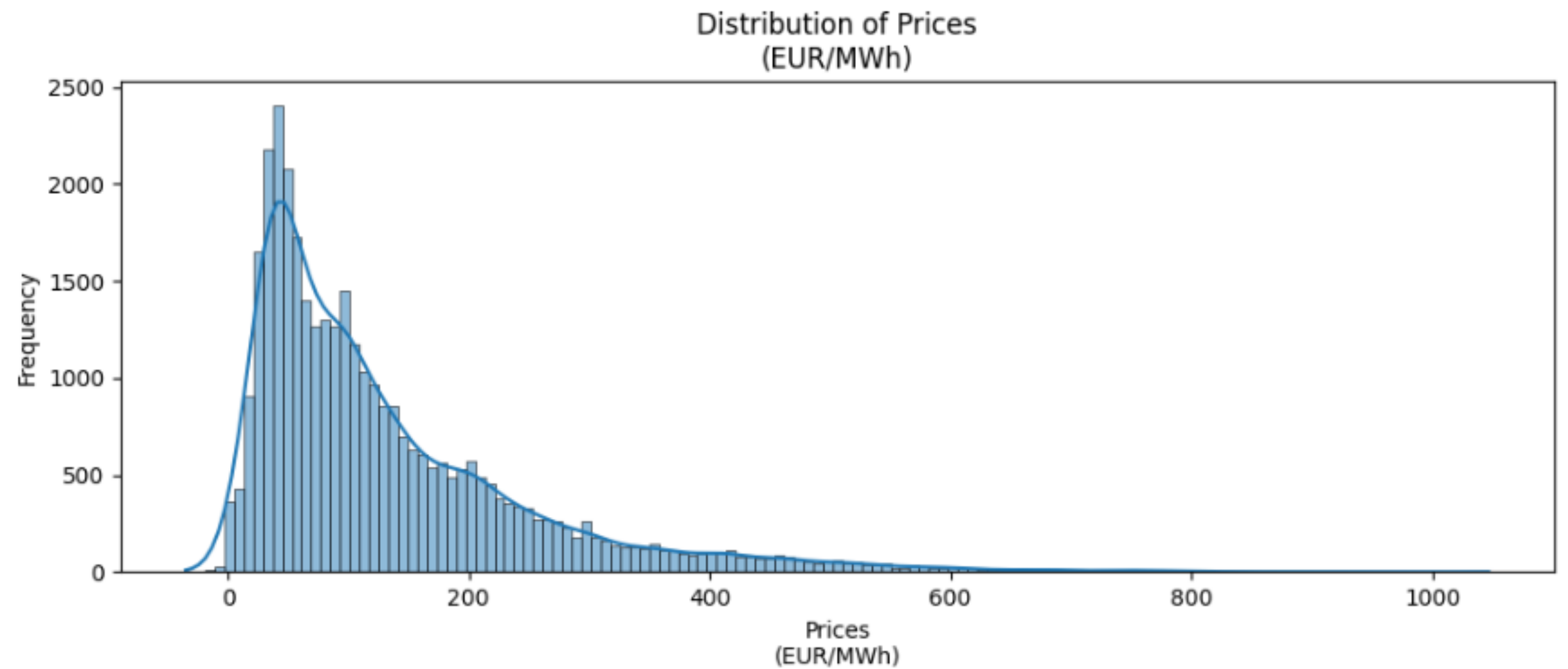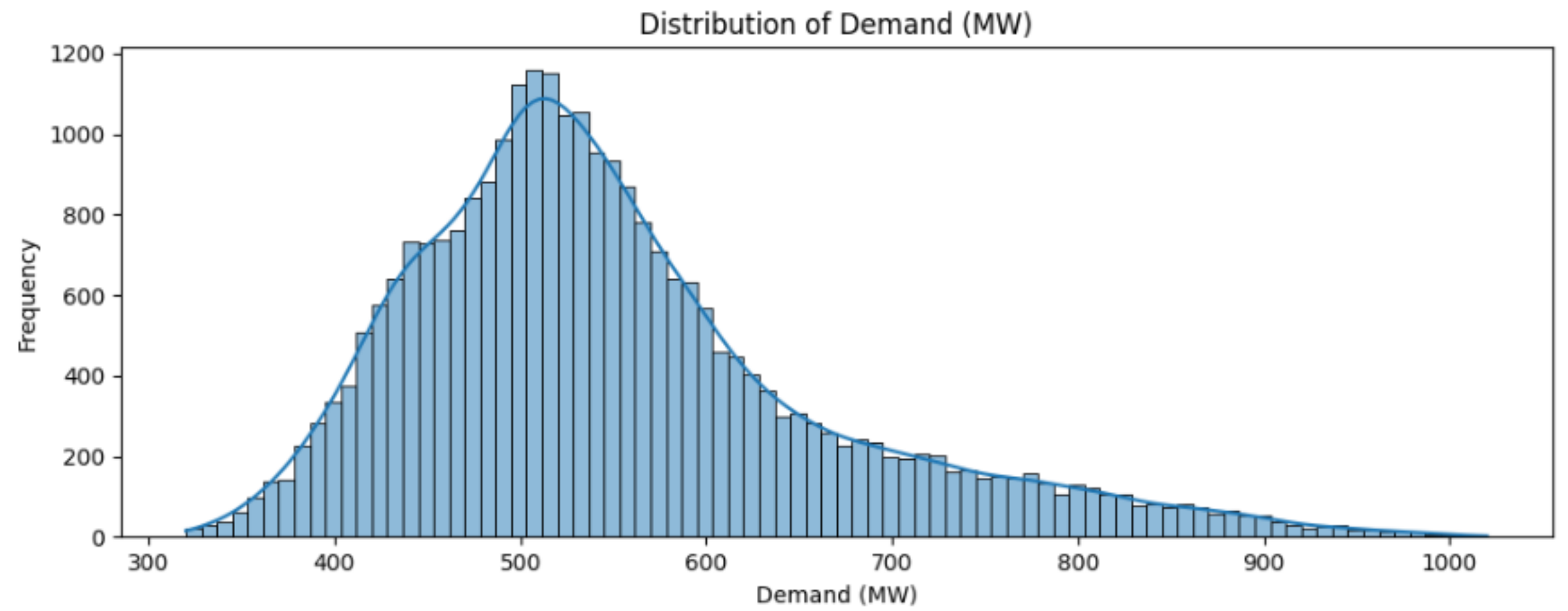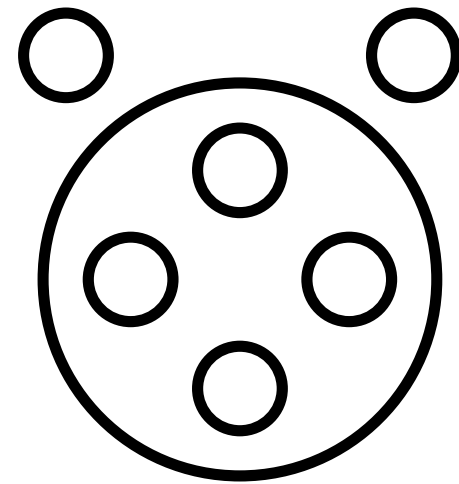
Scatter Plot
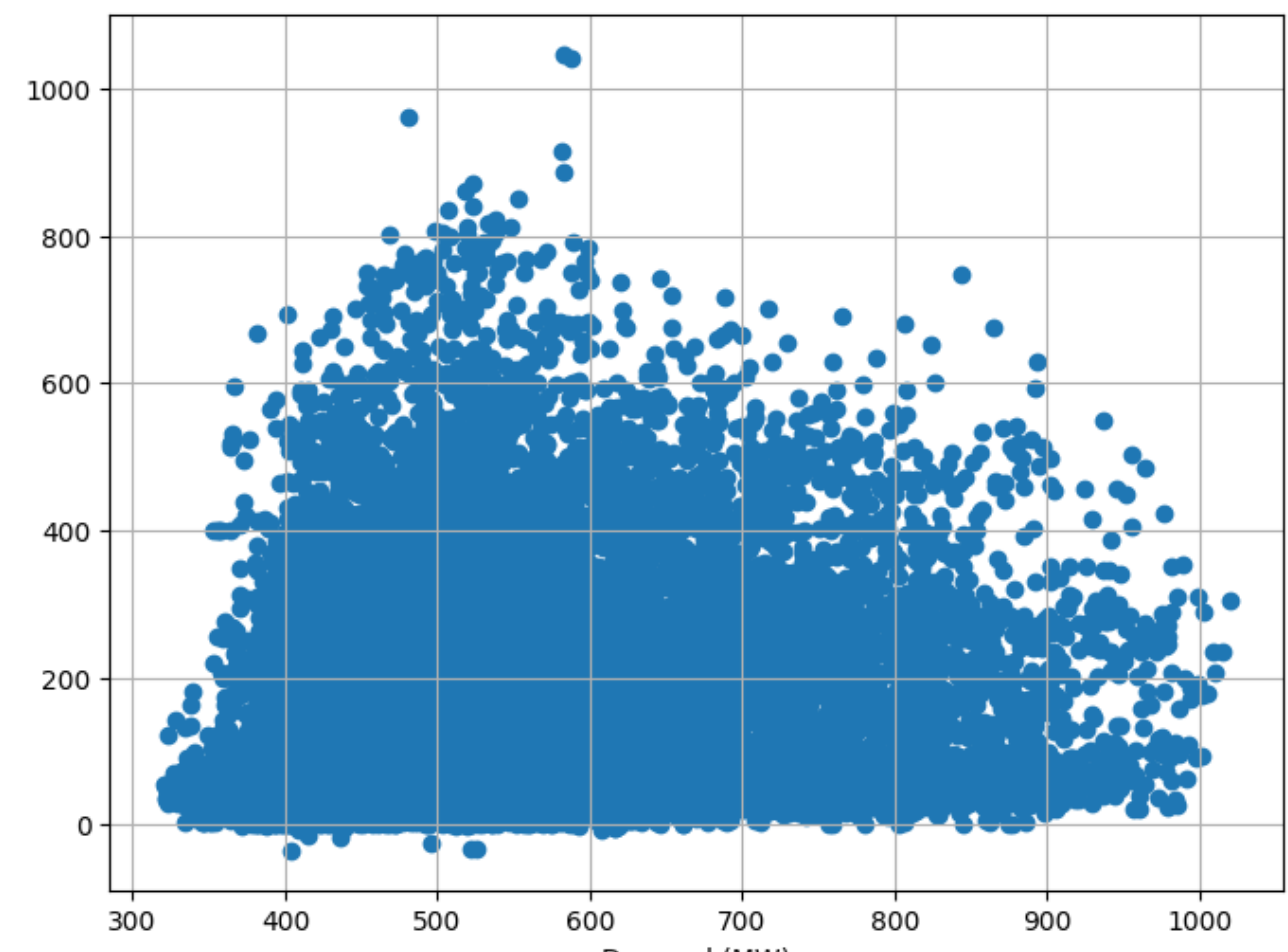
Price vs Demand
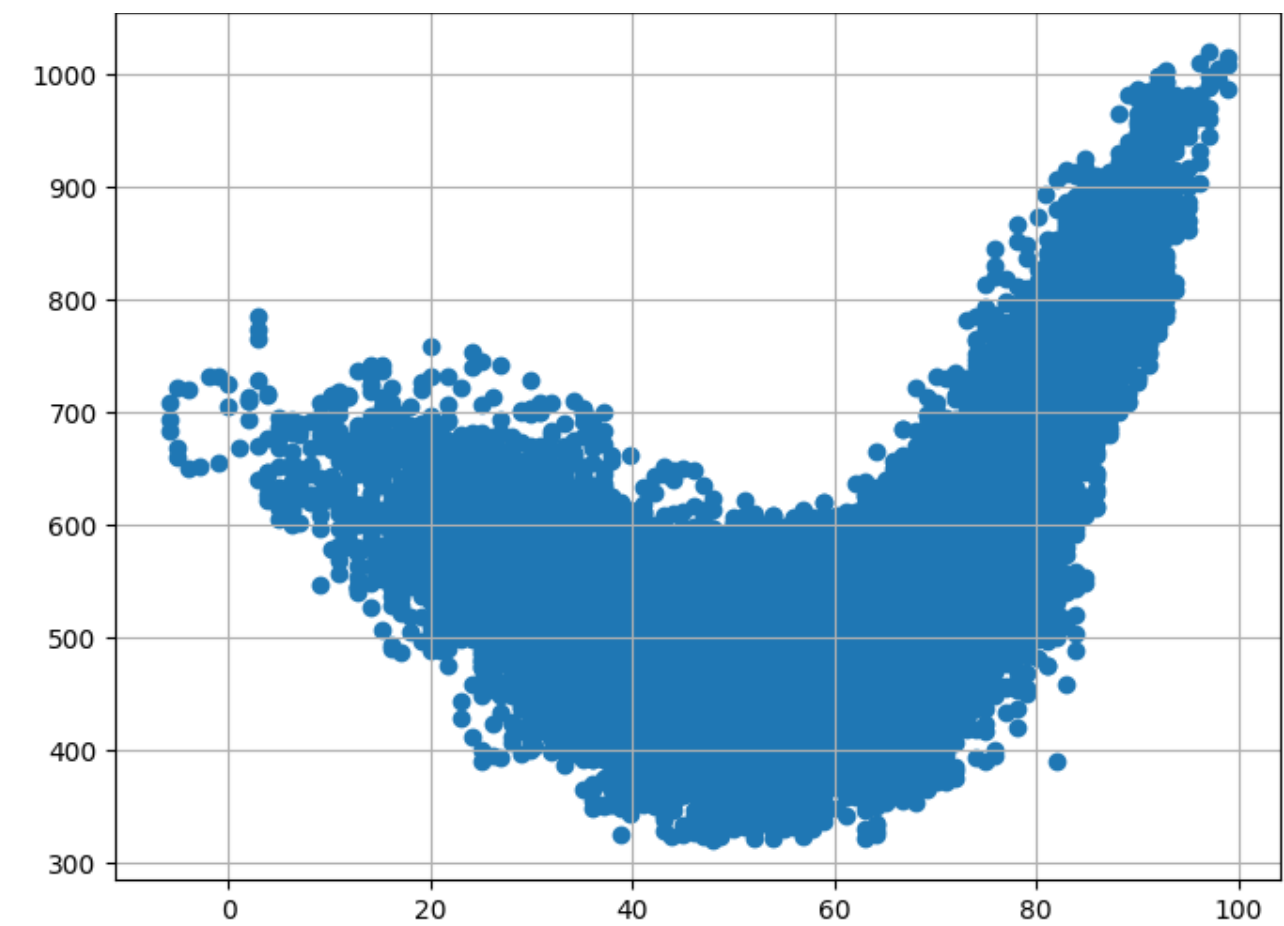
Temperature vs Demand
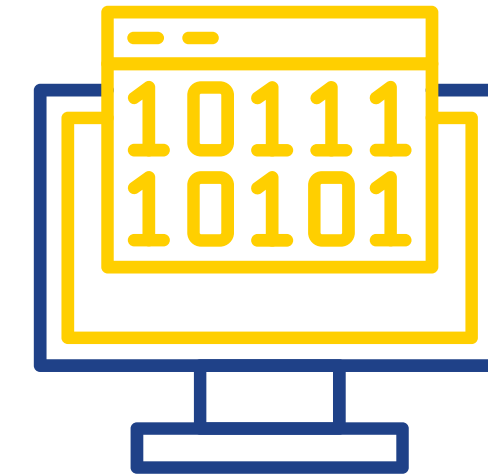
Data Transformation

Data Normalization

- Min-max normalization
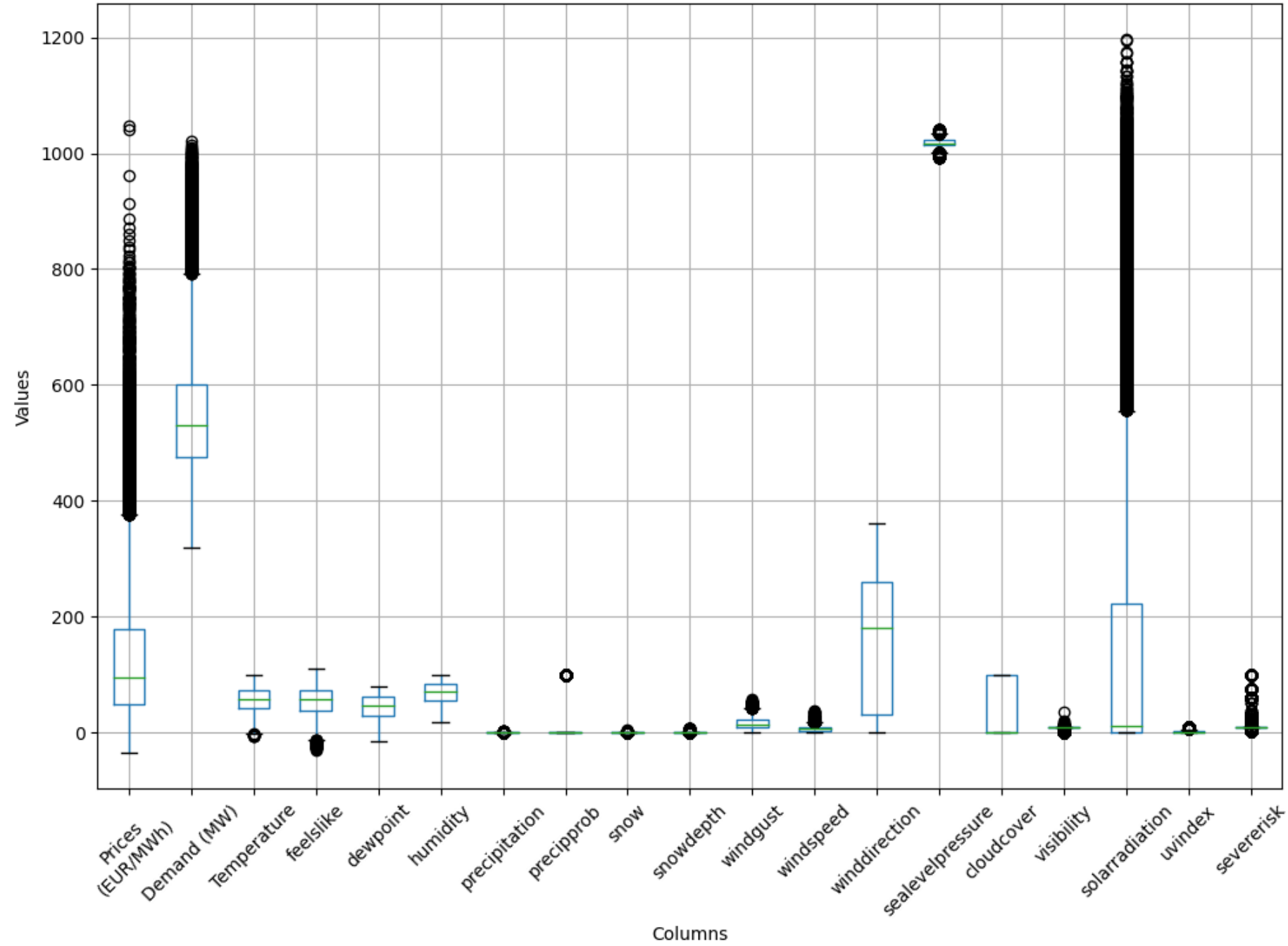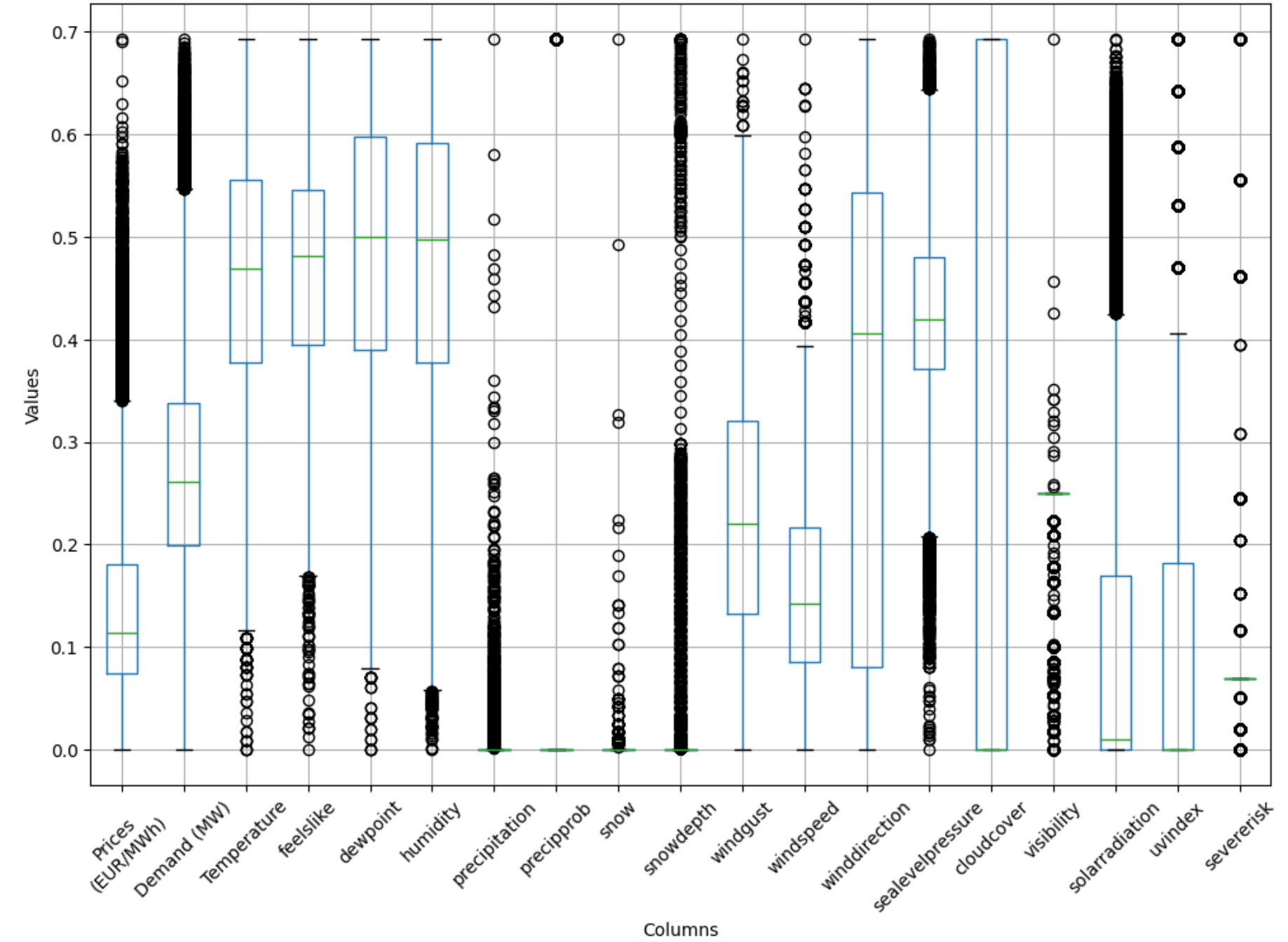
Outliers Handling

- Log transformation

One-hot encoding

Convert categorical value i.e
precipitation type
and conditions
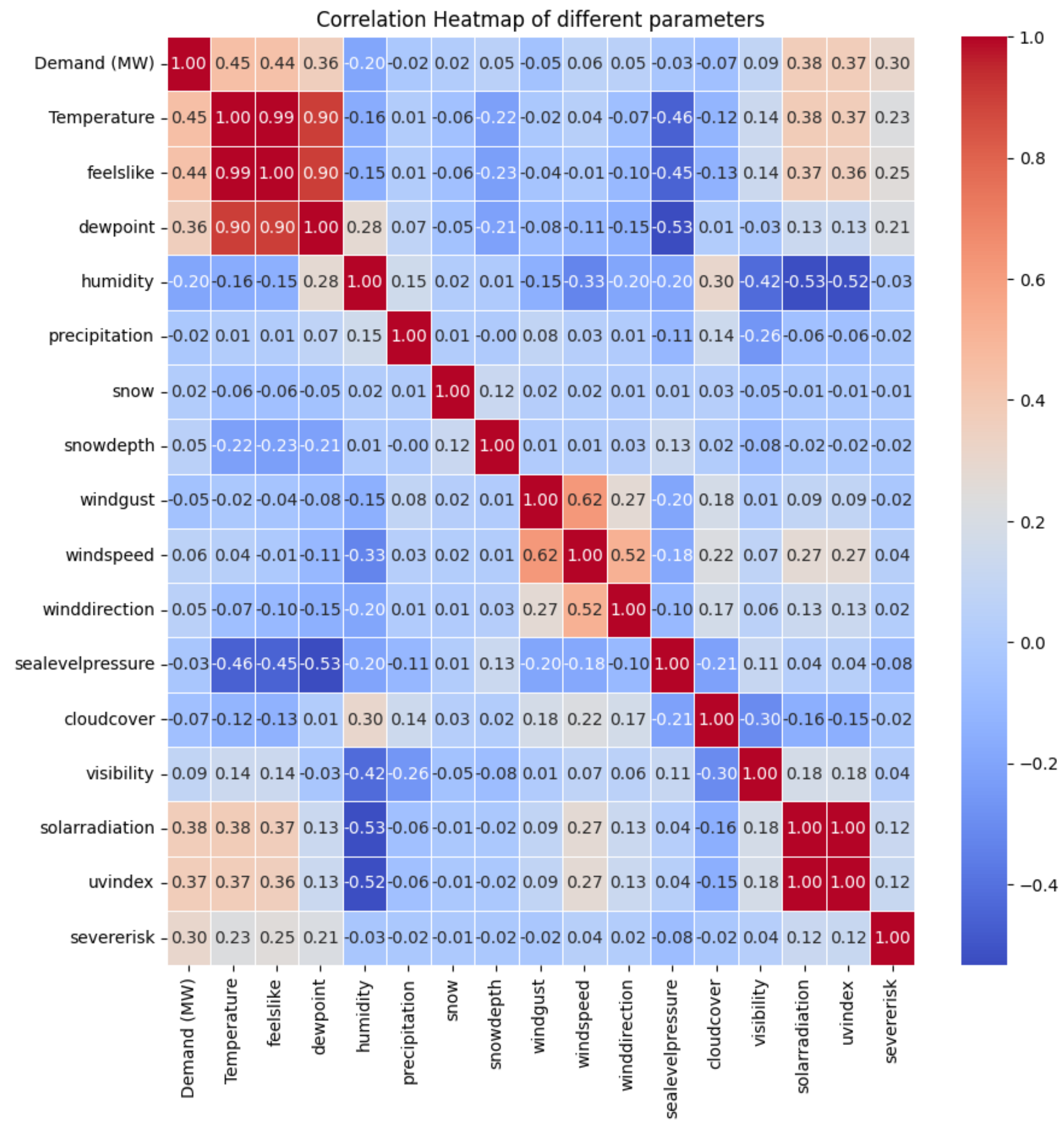into the one hot encoding format

Box plot for outliers detection

Correlation analysis

Correlation Heatmap of different parameters

LINE PLOT OF DEMAND VS Different Continuous Parameters
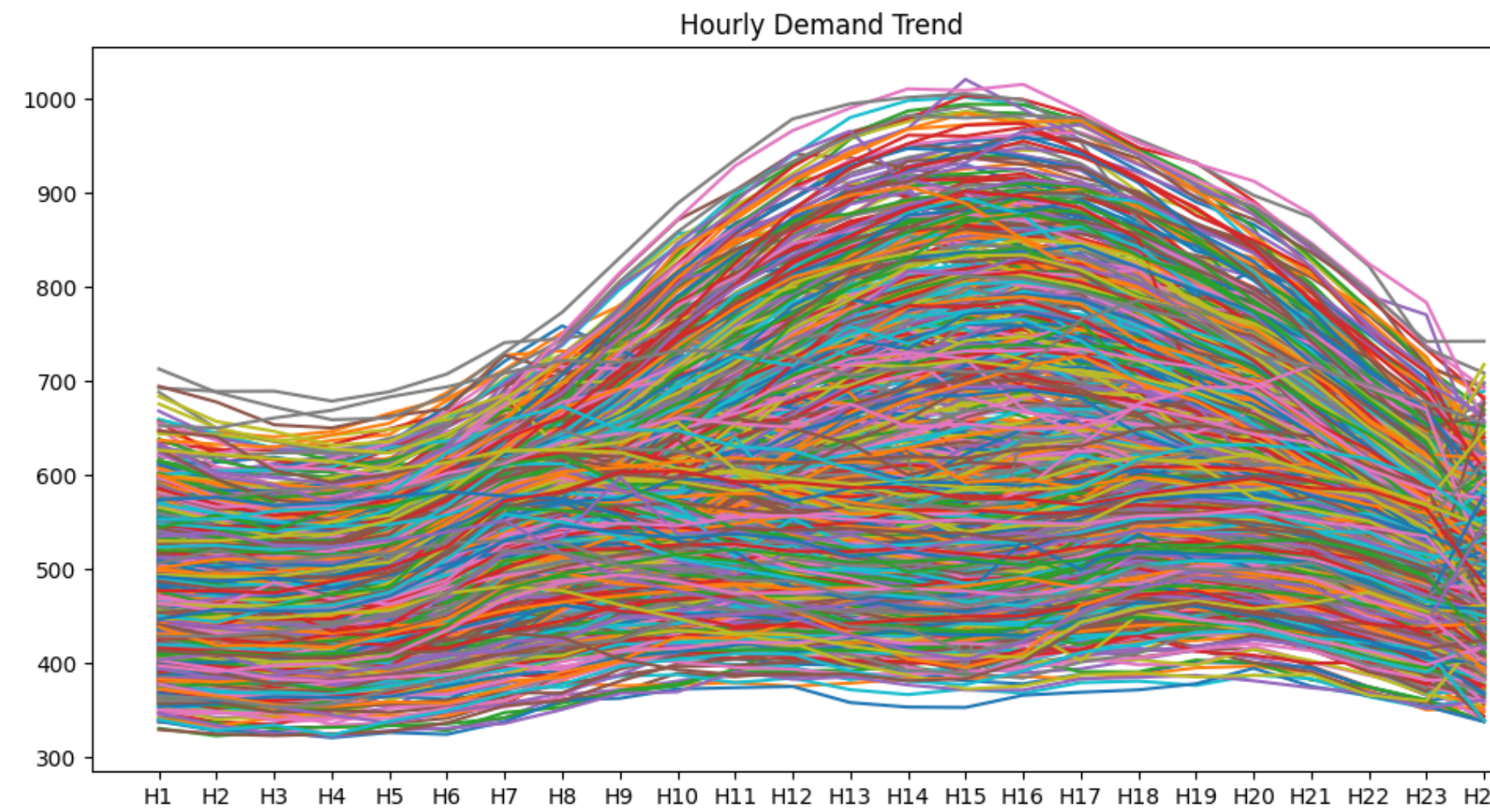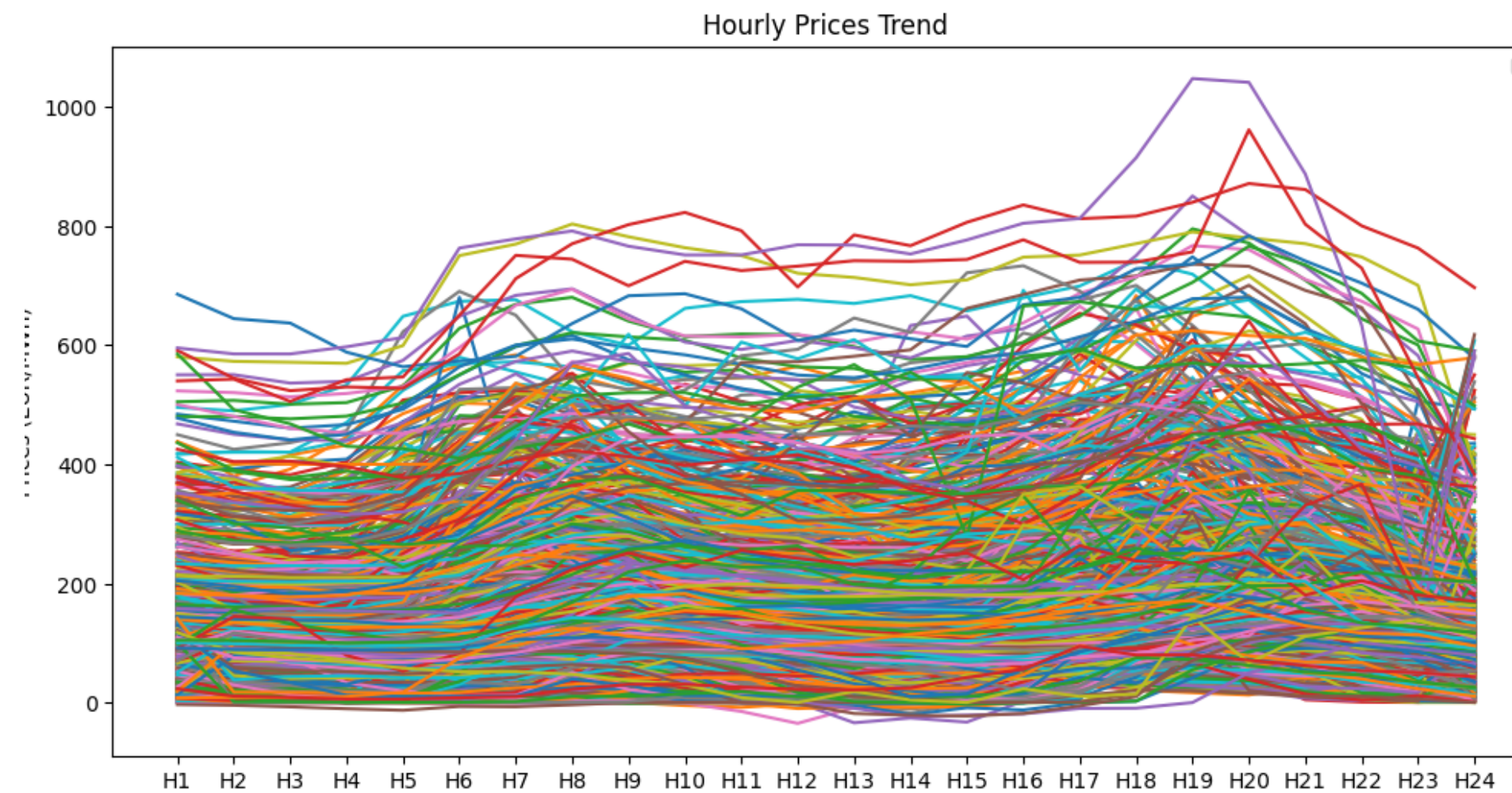

Demand and Temperature
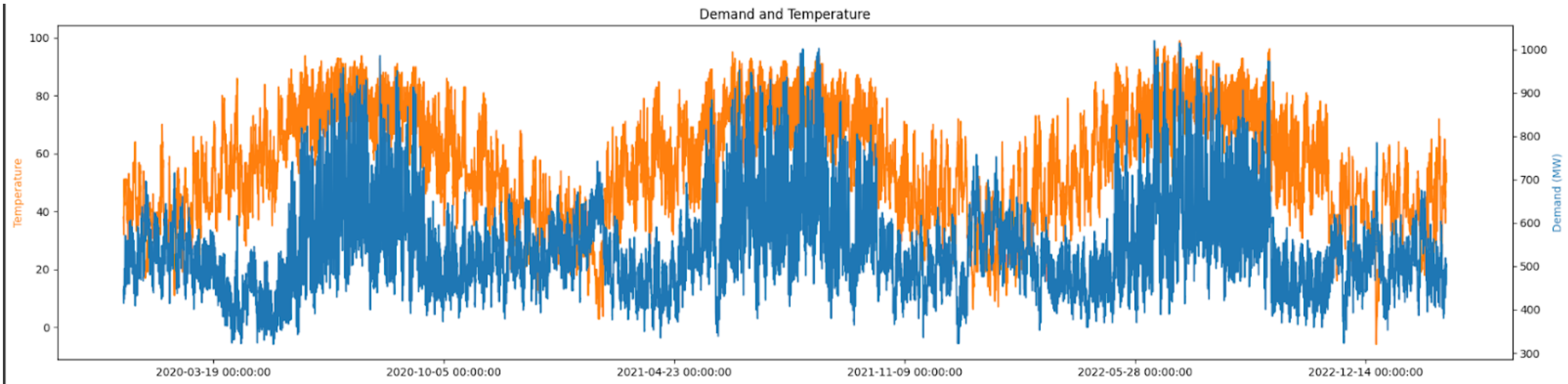
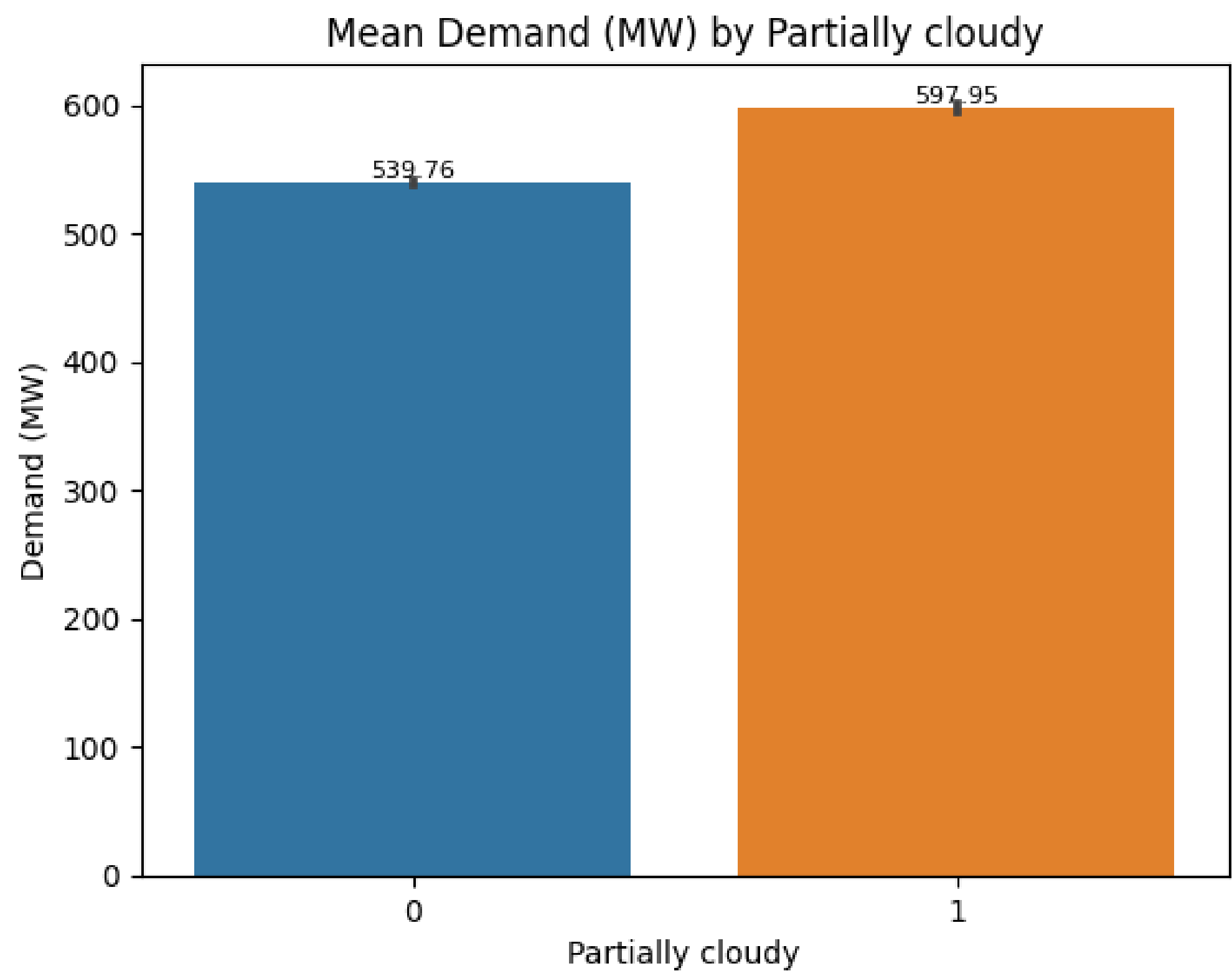fig: Line plot of Demand vs Temperature to visualize their correlation

Line Plot

Demand vs Hour

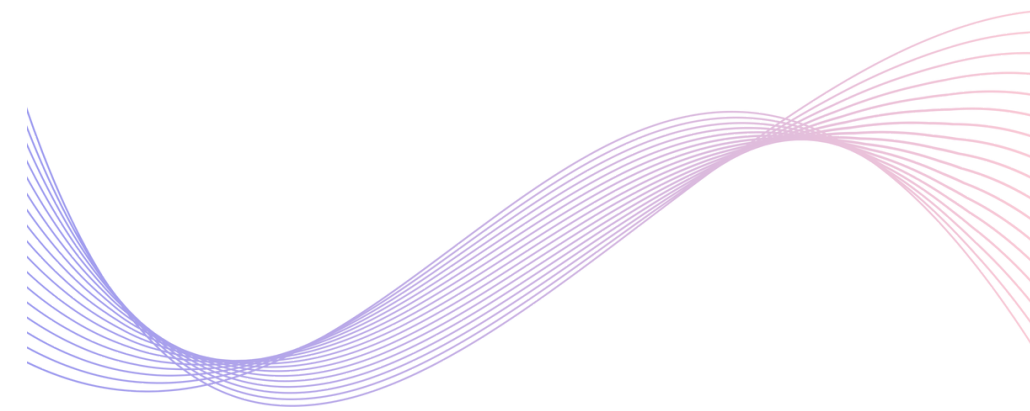Price vs Hour

BAR GRAPH PLOT FOR the MEAN Demand by Partially Cloudy

Mean Demand (MW) by Partially cloudy

Data Imputation
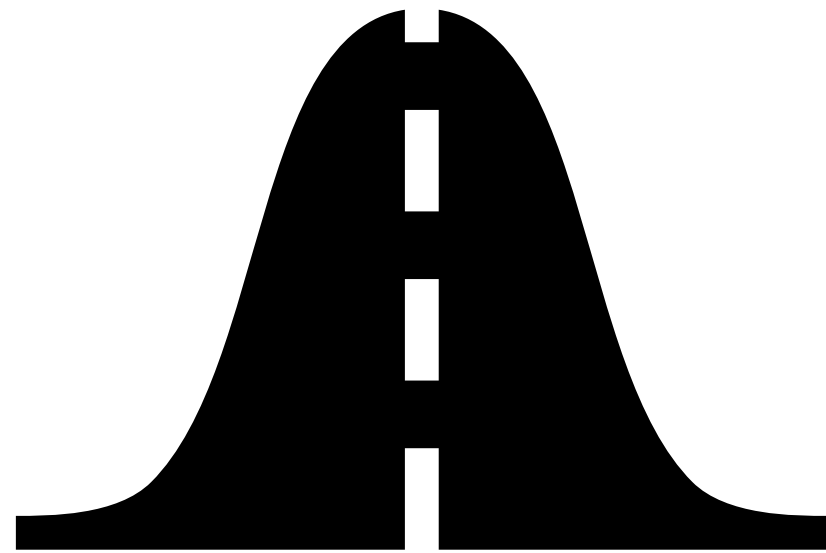
Distribution of 'windgust',
'severerisk',concentrated at a
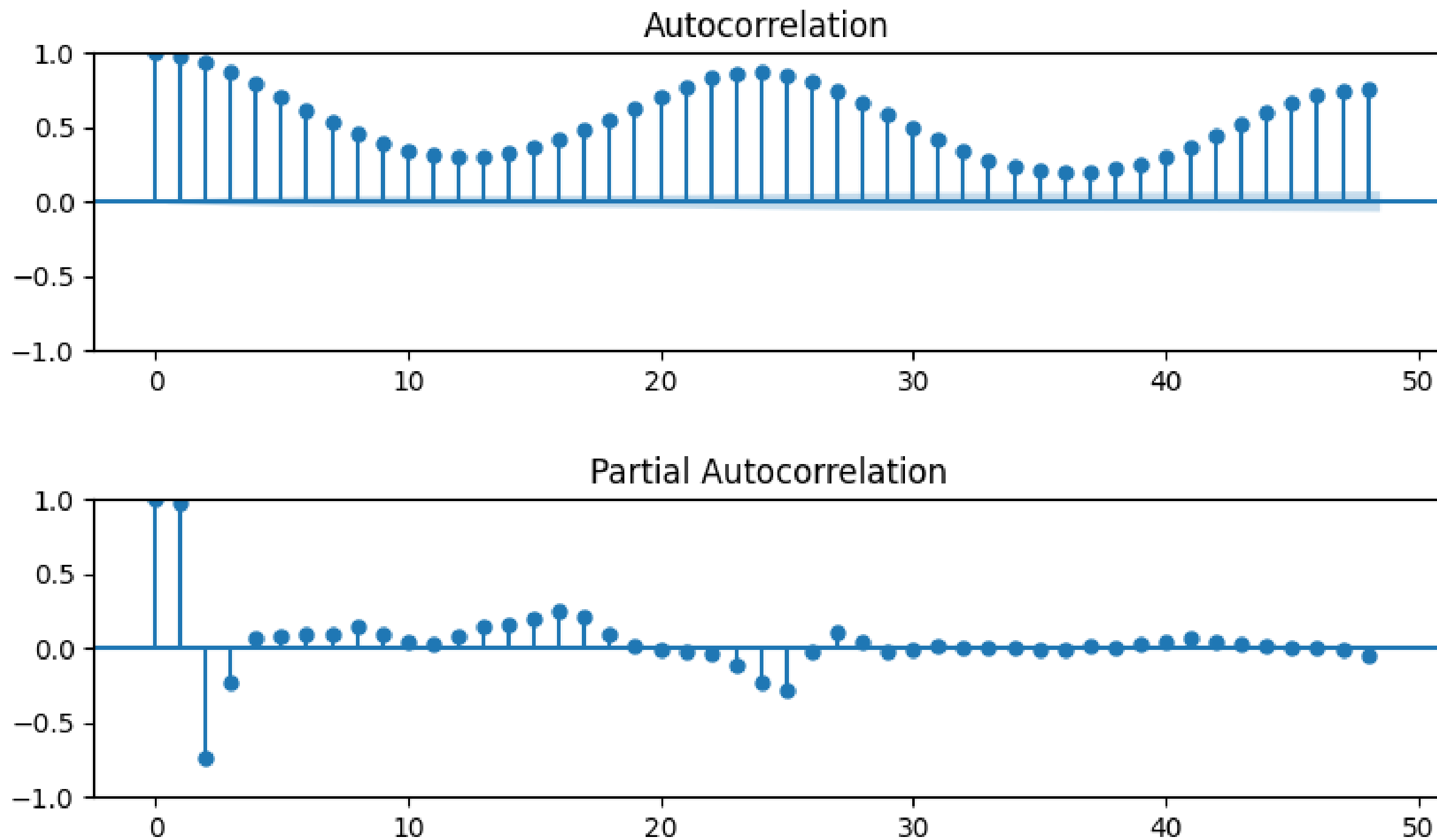point so **fill NaN with mean**
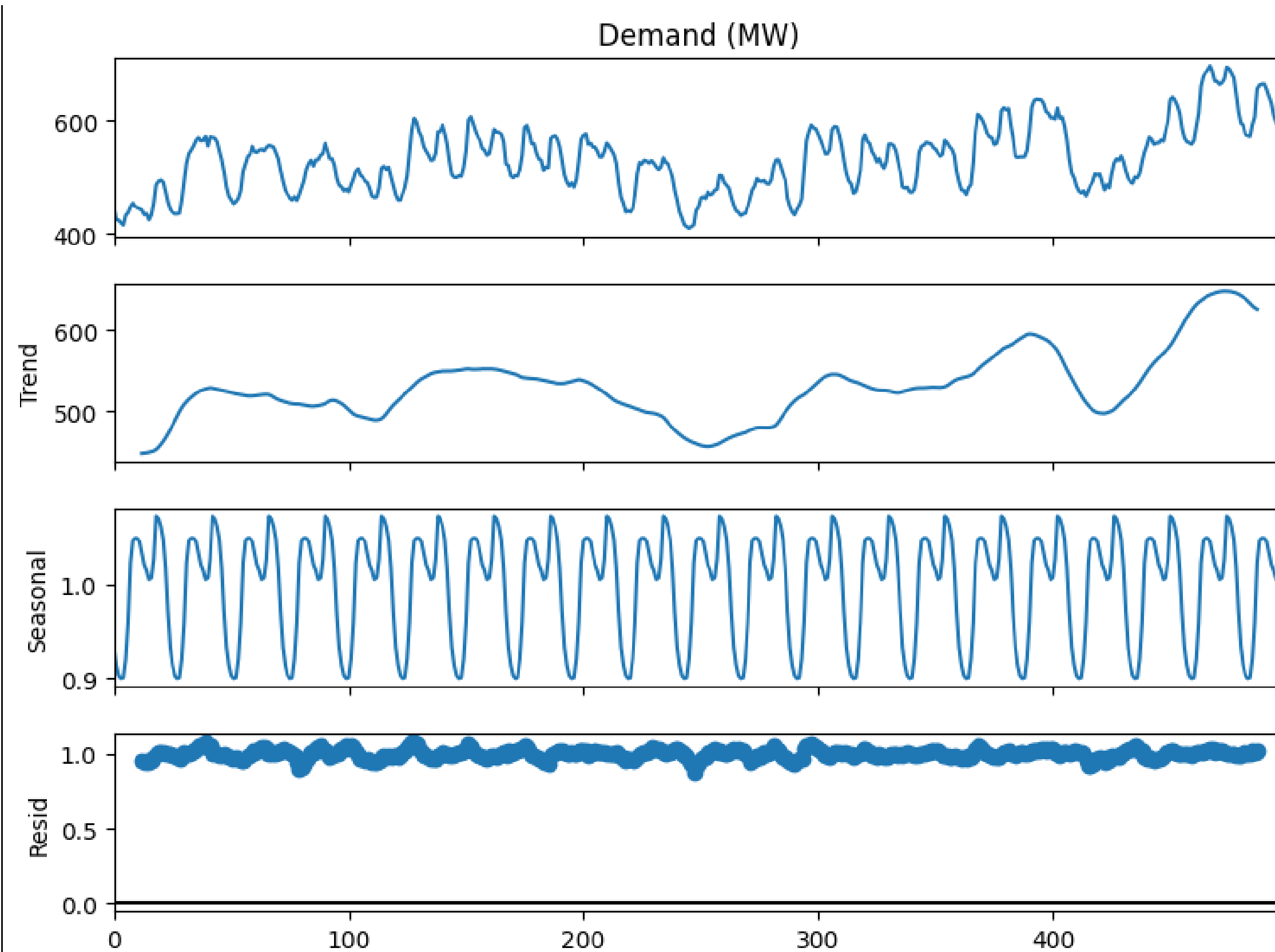

Interpolation in
remaining columns

Model Building

ACF and PACF of Demand Series

```
]:  plot_acf_pacf_graphs(X=demand_data, lags=48)
```
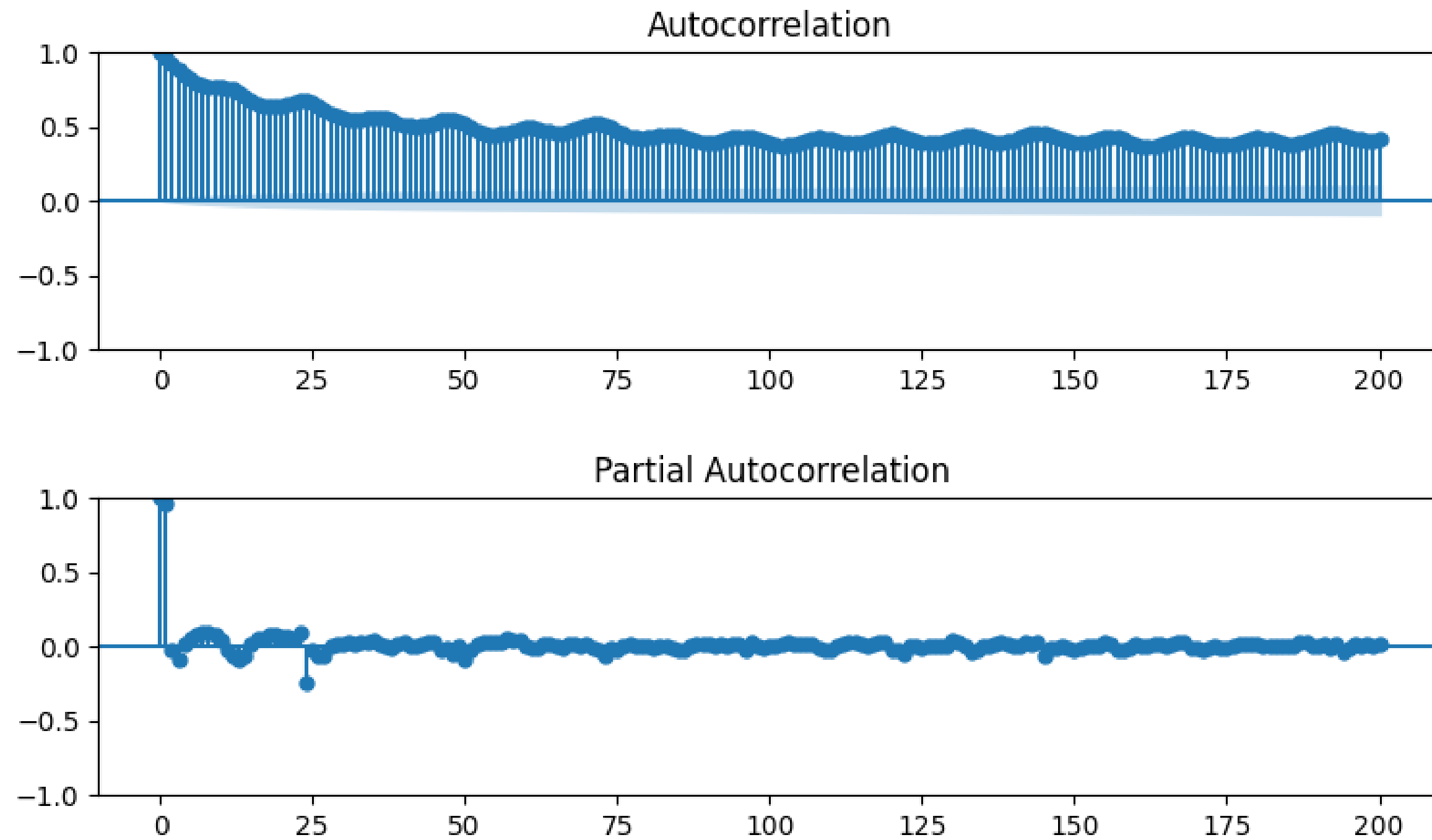
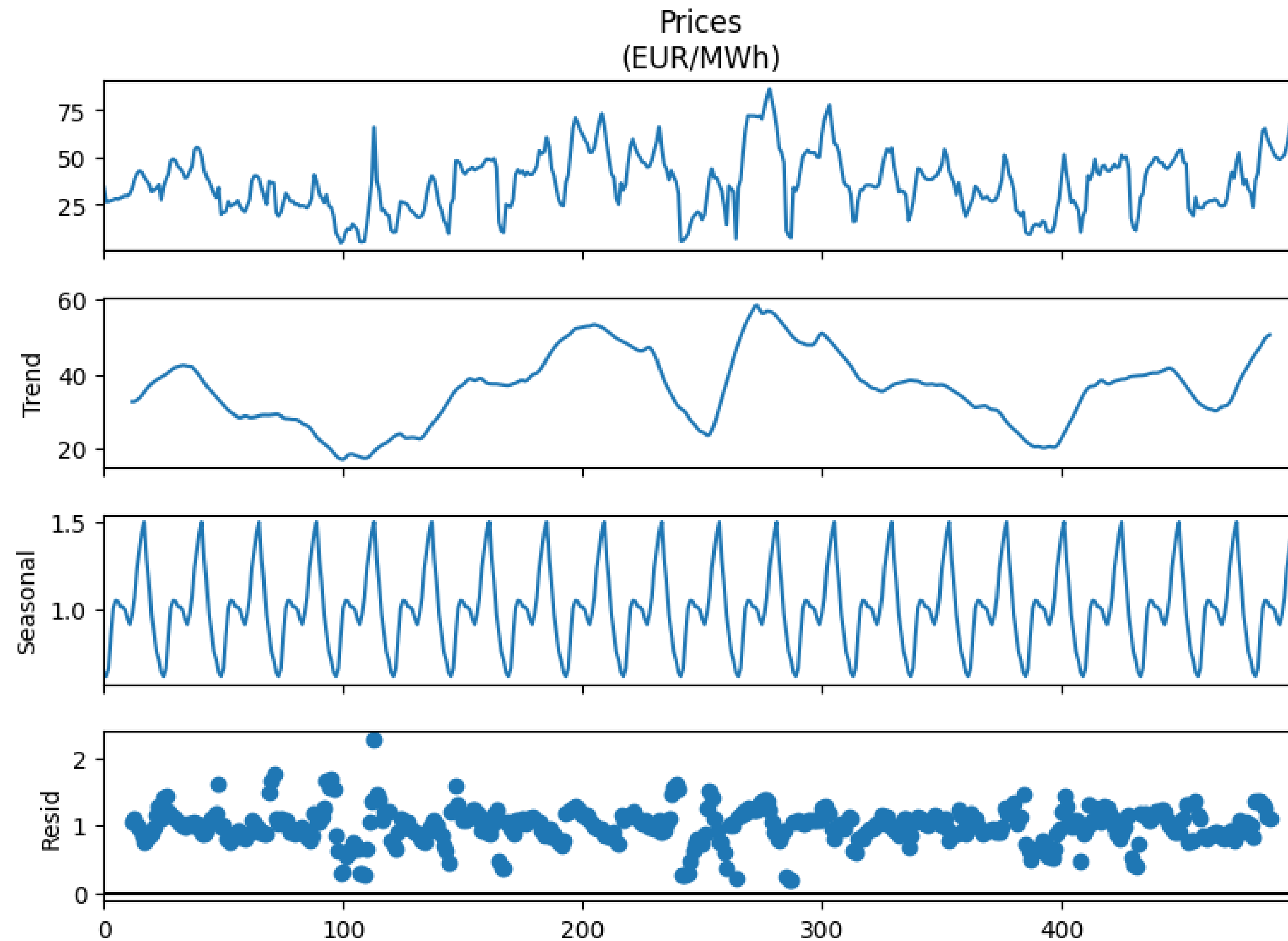# Multiplicative Seasonal Decomposition of Demand Series

ACF and PACF of Price Series

Multiplicative Seasonal Decomposition of Price Series

Next Steps

Experiment on different Machine Learning Algorithms

Thank You !