```
import pandas as pd
import matplotlib.pyplot as plt
import matplotlib

import sklearn
from sklearn import metrics
from sklearn.neighbors import KNeighborsRegressor
from scipy.cluster.vq import kmeans, vq, whiten
from scipy.spatial.distance import cdist
import numpy as np
from datetime import datetime

elec_all_data = pd.read_csv("C:\\Users\\anura\\Downloads\\
electricity.csv\\electricity.csv", index_col='timestamp',
parse_dates=True)

elec_all_data.info()
```

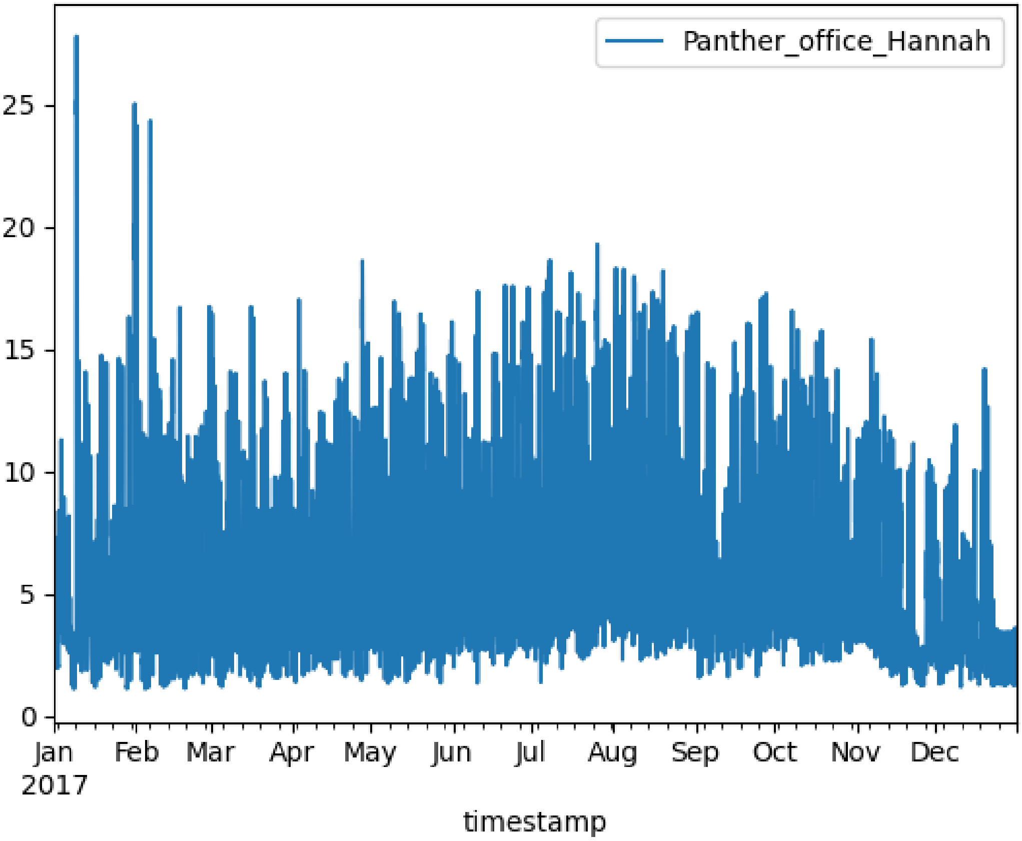
```
<class 'pandas.core.frame.DataFrame'>
DatetimeIndex: 17544 entries, 2016-01-01 00:00:00 to 2017-12-31
23:00:00
Columns: 555 entries, Panther_office_Clementine to
Cockatoo_health_Ashlie
dtypes: float64(555)
memory usage: 74.4 MB
```

```
buildingname = 'Panther_office_Hannah'

office_example_prediction_data =
pd.DataFrame(elec_all_data[buildingname].truncate(before='2017-01-
01')).fillna(method='ffill')

office_example_prediction_data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
DatetimeIndex: 8760 entries, 2017-01-01 00:00:00 to 2017-12-31
23:00:00
Data columns (total 1 columns):
 #   Column                 Non-Null Count  Dtype  
---  ------                 --------------  -----  
 0   Panther_office_Hannah  8760 non-null   float64
dtypes: float64(1)
memory usage: 136.9 KB
```

```
office_example_prediction_data.plot()
```

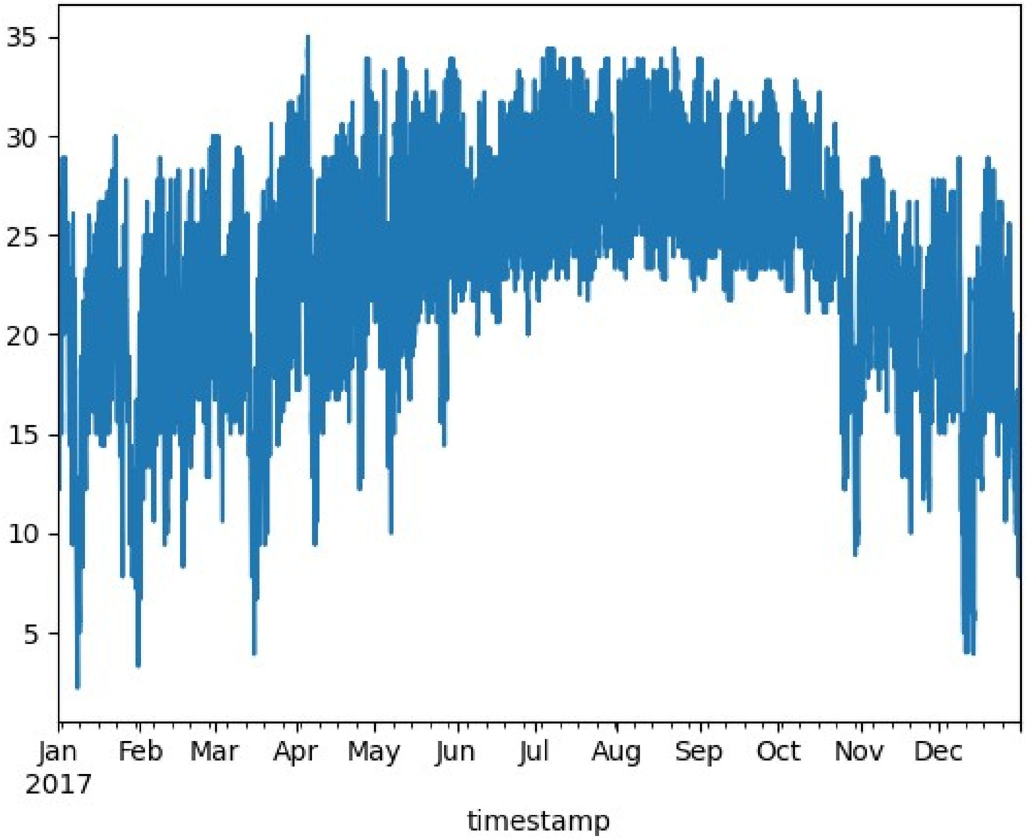
```
<Axes: xlabel='timestamp'>
```



```
weather_data = pd.read_csv("C:\\Users\\anura\\Downloads\\weather.csv\\
weather.csv", index_col='timestamp', parse_dates=True)

weather_data_site = weather_data[weather_data.site_id ==
'Panther'].truncate(before='2017-01-01')

print(weather_data.columns)

Index(['site_id', 'airTemperature', 'cloudCoverage', 'dewTemperature',
       'precipDepth1HR', 'precipDepth6HR', 'seaLvlPressure',
'windDirection',
       'windSpeed'],
      dtype='object')

# Step 1: Select only numeric columns
weather_numeric = weather_data_site.select_dtypes(include='number')

# Step 2: Resample to hourly frequency and calculate mean
weather_hourly = weather_numeric.resample("H").mean()

# Step 3: Remove outliers (e.g., values less than -40)
weather_hourly_nooutlier = weather_hourly[weather_hourly > -40]

# Step 4: Fill missing values using forward fill
```

```
weather_hourly_nooutlier_nogaps =
weather_hourly_nooutlier.fillna(method='ffill')

temperature = weather_hourly_nooutlier_nogaps["airTemperature"]

temperature.plot()
```

```
<Axes: xlabel='timestamp'>
```



```
training_months = [4,5,6]
test_months = [7]

trainingdata =
office_example_prediction_data[office_example_prediction_data.index.mo
nth.isin(training_months)]
testdata =
office_example_prediction_data[office_example_prediction_data.index.mo
nth.isin(test_months)]

trainingdata.info()
```

```
<class 'pandas.core.frame.DataFrame'>
DatetimeIndex: 2184 entries, 2017-04-01 00:00:00 to 2017-06-30
23:00:00
```

```
Data columns (total 1 columns):
 #   Column                 Non-Null Count  Dtype  
---  ------                 --------------  -----  
 0   Panther_office_Hannah  2184 non-null   float64
dtypes: float64(1)
memory usage: 34.1 KB
```

```
testdata.info()
```

```
<class 'pandas.core.frame.DataFrame'>
DatetimeIndex: 744 entries, 2017-07-01 00:00:00 to 2017-07-31 23:00:00
Data columns (total 1 columns):
 #   Column                 Non-Null Count  Dtype  
---  ------                 --------------  -----  
 0   Panther_office_Hannah  744 non-null    float64
dtypes: float64(1)
memory usage: 11.6 KB
```

```
train_features = pd.concat([pd.get_dummies(trainingdata.index.hour),

pd.get_dummies(trainingdata.index.dayofweek),

pd.DataFrame(temperature[temperature.index.month.isin(training_months)
].values)], axis=1).dropna()
```

```
train_features.head()
```

```
      0      1      2      3      4      5      6      7      8      9
...  \
0   True  False  False  False  False  False  False  False  False  
False  ...   
1  False   True  False  False  False  False  False  False  False  
False  ...   
2  False  False   True  False  False  False  False  False  False  
False  ...   
3  False  False  False   True  False  False  False  False  False  
False  ...   
4  False  False  False  False   True  False  False  False  False  
False  ...   

      22     23      0      1      2      3      4     5      6     0  

0  False  False  False  False  False  False  False  True  False  21.7  

1  False  False  False  False  False  False  False  True  False  21.0  

2  False  False  False  False  False  False  False  True  False  18.9  

3  False  False  False  False  False  False  False  True  False  20.6  

4  False  False  False  False  False  False  False  True  False  21.0  
```

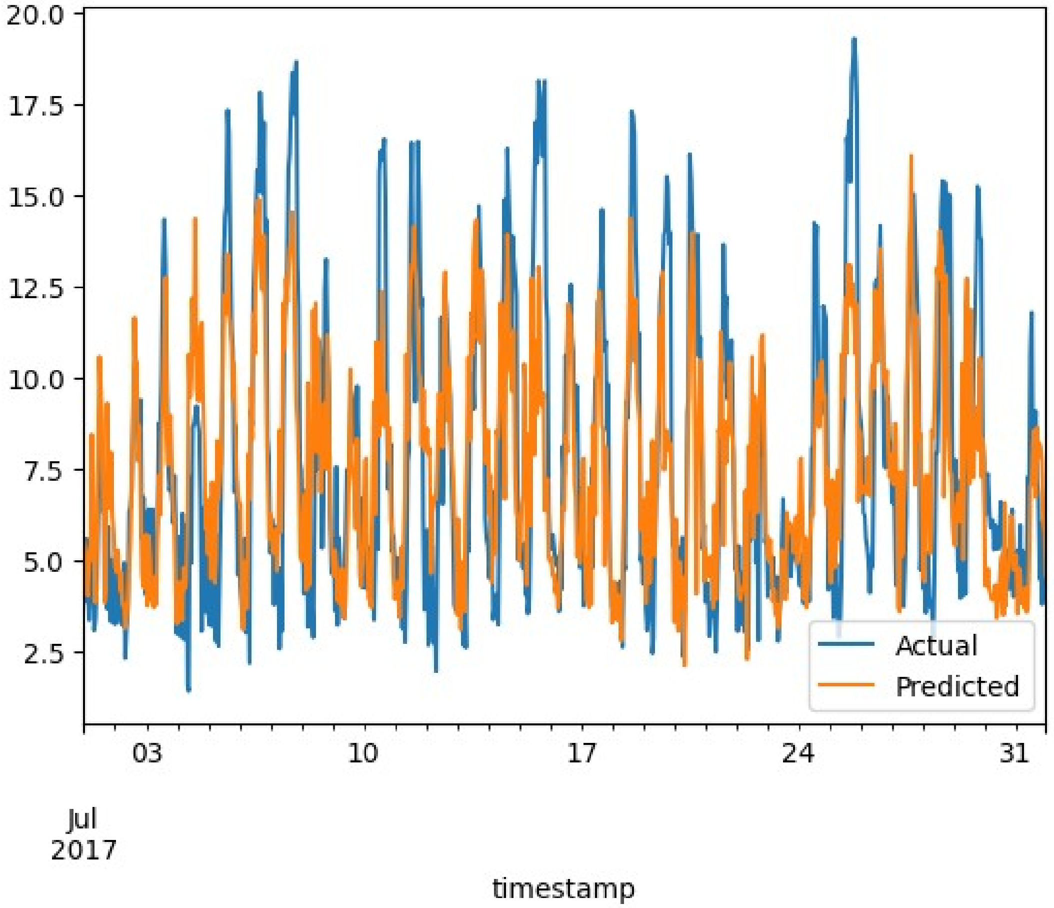
```
[5 rows x 32 columns]
```

```
model = KNeighborsRegressor().fit(np.array(train_features),
np.array(trainingdata.values));

test_features =
np.array(pd.concat([pd.get_dummies(testdata.index.hour),

pd.get_dummies(testdata.index.dayofweek),

pd.DataFrame(temperature[temperature.index.month.isin(test_months)].va
lues)], axis=1).dropna())

predictions = model.predict(test_features)

predicted_vs_actual = pd.concat([testdata, pd.DataFrame(predictions,
index=testdata.index)], axis=1)

predicted_vs_actual.columns = ["Actual", "Predicted"]

predicted_vs_actual.head()
```

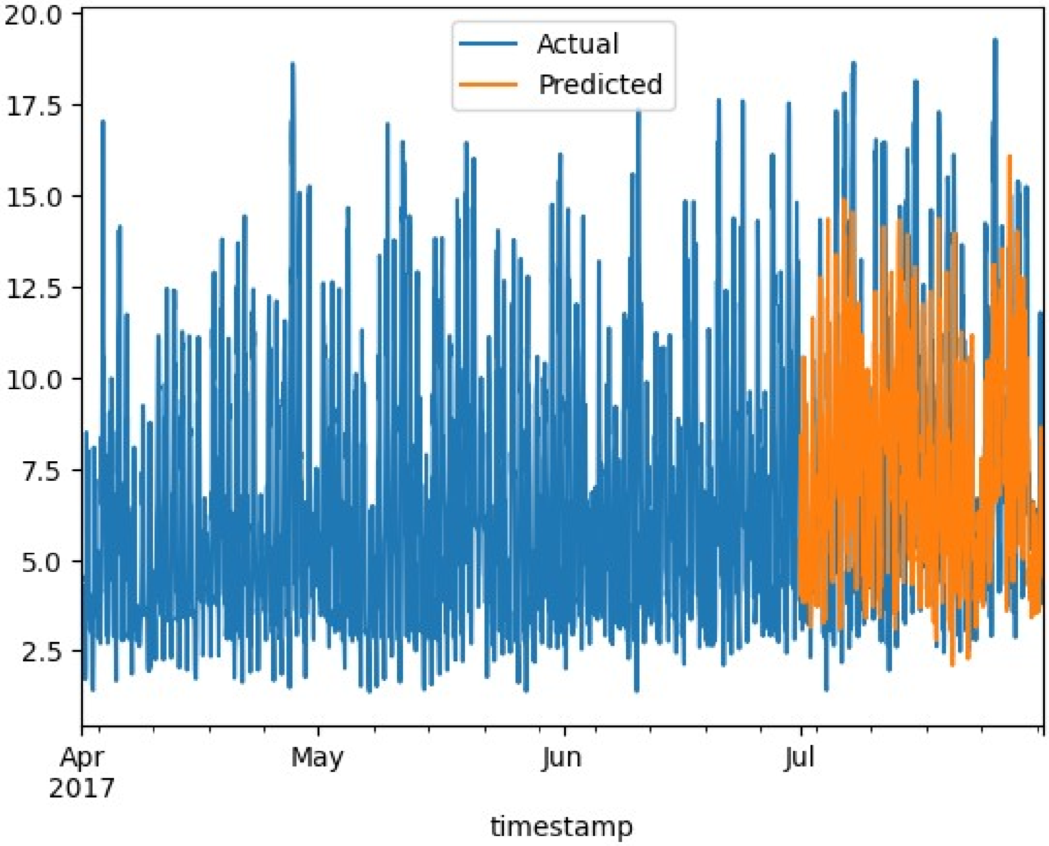
```
                     Actual  Predicted
timestamp
2017-07-01 00:00:00  5.3370    5.49464
2017-07-01 01:00:00  3.8547    5.03418
2017-07-01 02:00:00  5.5751    4.18462
2017-07-01 03:00:00  4.1248    4.01956
2017-07-01 04:00:00  3.3497    5.26522
```

```
predicted_vs_actual.plot()
```

```
<Axes: xlabel='timestamp'>
```



```
trainingdata.columns = ["Actual"]

predicted_vs_actual_plus_training = pd.concat([trainingdata,
predicted_vs_actual], sort=True)

predicted_vs_actual_plus_training.plot()

<Axes: xlabel='timestamp'>
```



```
# Calculate the absolute errors
errors = abs(predicted_vs_actual['Predicted'] -
predicted_vs_actual['Actual'])
# Calculate mean absolute percentage error (MAPE) and add to list
MAPE = 100 * np.mean((errors / predicted_vs_actual['Actual']))

MAPE
```

```
np.float64(33.58833043899184)
```