Stationary_Test_Informer_ETDataset_ETT-small_ETTh2.csv

February 23, 2021

[1]:
```
from dateutil.parser import parse
import matplotlib as mpl
import matplotlib.pyplot as plt
import seaborn as sns
import numpy as np
import pandas as pd
```

[3]:
```
df = pd.read_csv('https://raw.githubusercontent.com/zhouhaoyi/ETDataset/main/
↪ETT-small/ETTh2.csv',
parse_dates=['date'], index_col='date')
```

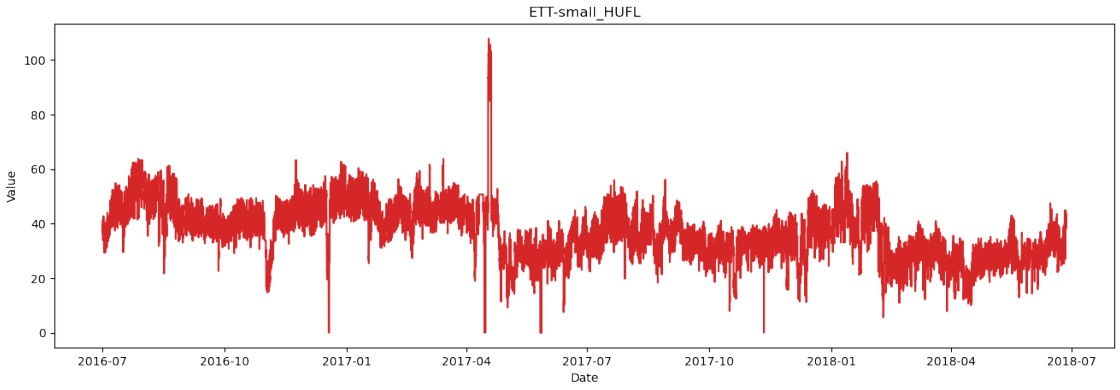
[4]:
```
df.head()
```

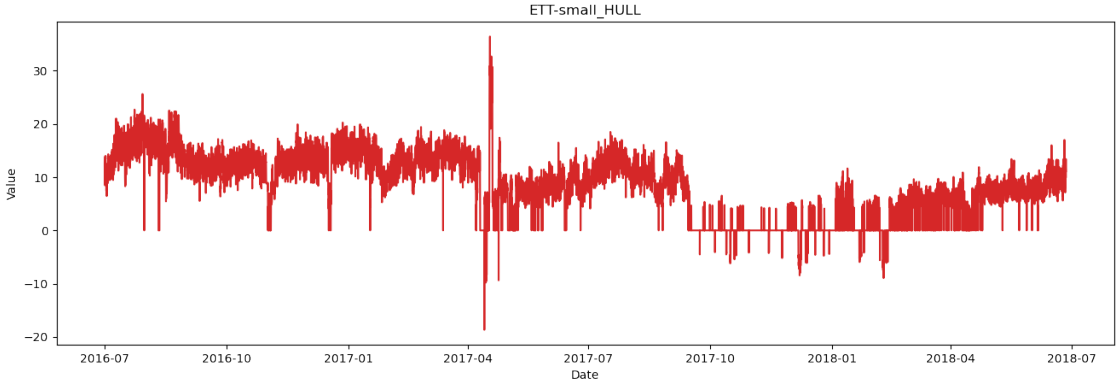
[4]:

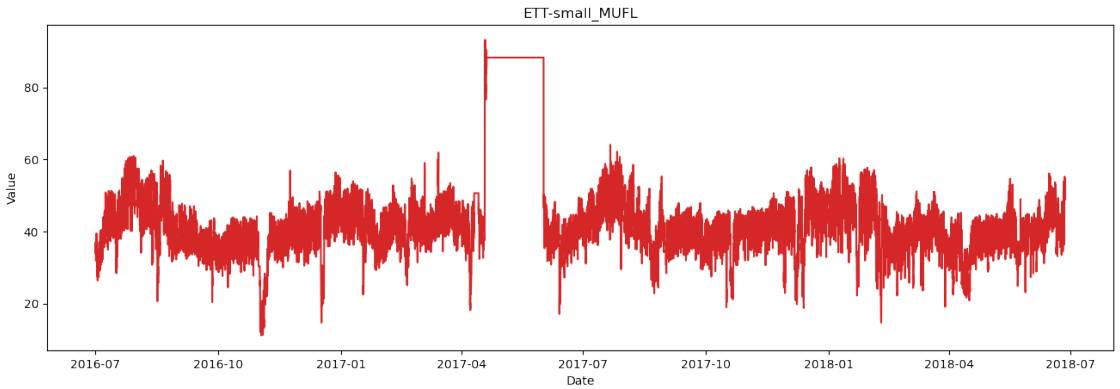
date	HUFL	HULL	MUFL	MULL	LUFL	LULL	OT
2016-07-01 00:00:00	41.130001	12.481	36.535999	9.355	4.424	1.311	38.661999
2016-07-01 01:00:00	37.528000	10.136	33.936001	7.532	4.435	1.215	37.124001
2016-07-01 02:00:00	37.946999	11.309	35.330002	9.007	2.100	0.000	36.465000
2016-07-01 03:00:00	38.952000	11.895	35.543999	9.436	3.380	1.215	33.608501
2016-07-01 04:00:00	38.113998	11.476	35.410000	9.623	2.036	0.000	31.850500

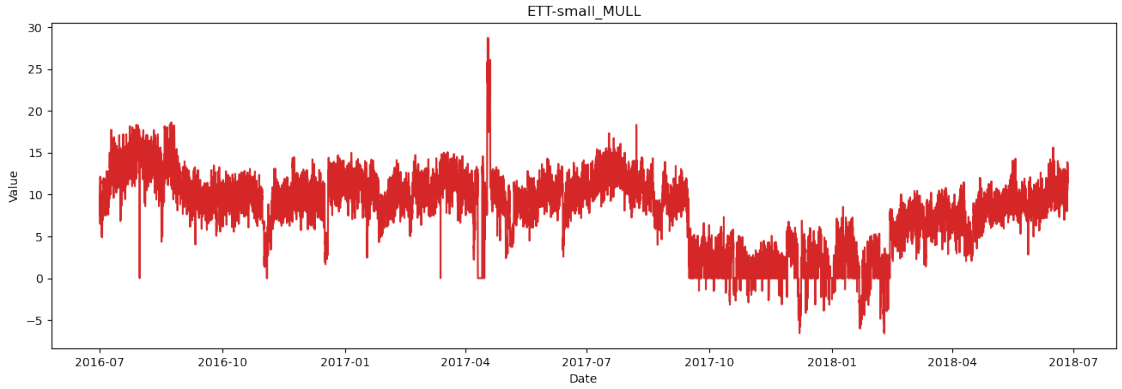
[5]:
```
def plot_df(df, x, y, title="", xlabel='Date', ylabel='Value', dpi=100):
    plt.figure(figsize=(16,5), dpi=dpi)
    plt.plot(x, y, color='tab:red')
    plt.gca().set(title=title, xlabel=xlabel, ylabel=ylabel)
    plt.show()

plot_df(df, x=df.index, y=df.HUFL, title='ETT-small_HUFL')
plot_df(df, x=df.index, y=df.HULL, title='ETT-small_HULL')
```

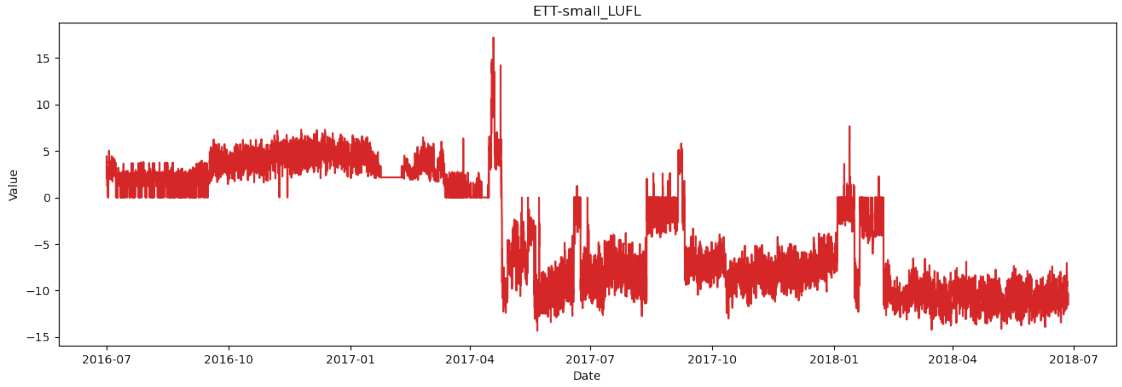
```
plot_df(df, x=df.index, y=df.MUFL, title='ETT-small_MUFL')
plot_df(df, x=df.index, y=df.MULL, title='ETT-small_MULL')
plot_df(df, x=df.index, y=df.LUFL, title='ETT-small_LUFL')
plot_df(df, x=df.index, y=df.LULL, title='ETT-small_LULL')
plot_df(df, x=df.index, y=df.OT, title='ETT-small_OT')
```

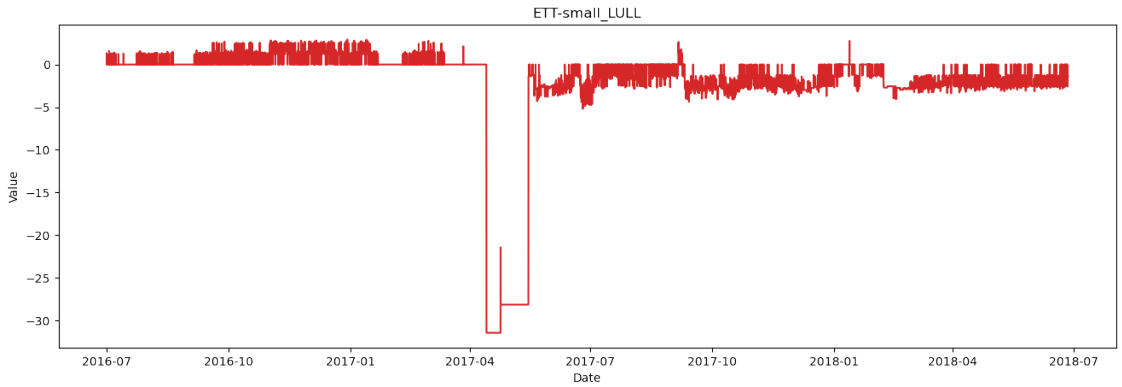


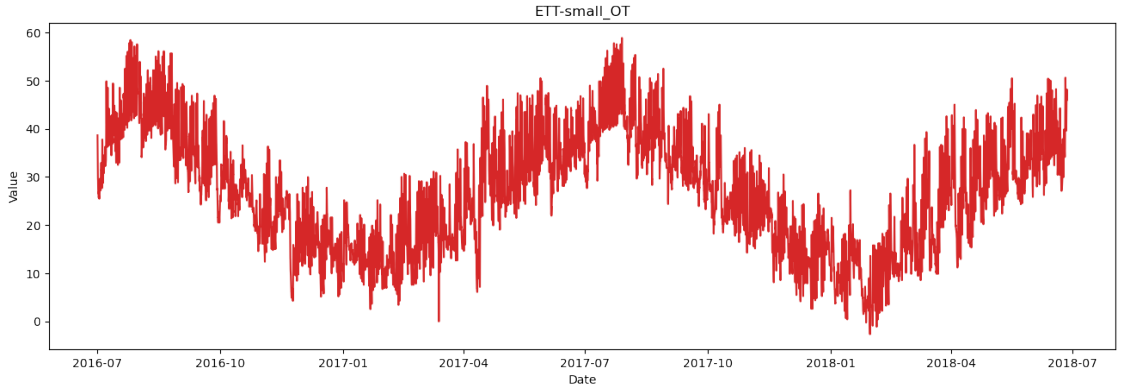





ETT-small_MULL
Value
Date
30
25
20
15
10
5
0
−5
2016-07
2016-10
2017-01
2017-04
2017-07
2017-10
2018-01
2018-04
2018-07


ETT-small_LUFL
Value
Date
15
10
5
0
−5
−10
−15
2016-07
2016-10
2017-01
2017-04
2017-07
2017-10
2018-01
2018-04
2018-07


ETT-small_LULL
Value
Date
0
−5
−10
−15
−20
−25
−30
2016-07
2016-10
2017-01
2017-04
2017-07
2017-10
2018-01
2018-04
2018-07



[6]:
```
n_obs = 20
df_train, df_test = df[0:-n_obs], df[-n_obs:]

from statsmodels.tsa.stattools import adfuller


def adf_test(df):
    result = adfuller(df.values)
    print('ADF Statistics: %f' % result[0])
    print('p-value: %f' % result[1])
    print('Critical values:')
    for key, value in result[4].items():
        print('\t%s: %.3f' % (key, value))

print('ADF Test: ETT-small_HUFL Time series')
adf_test(df_train['HUFL'])

print('\n\nADF Test: ETT-small_HULL Time series')
adf_test(df_train['HULL'])

print('\n\nADF Test: ETT-small_MUFL Time series')
adf_test(df_train['MUFL'])

print('\n\nADF Test: ETT-small_MULL Time series')
adf_test(df_train['MULL'])

print('\n\nADF Test: ETT-small_LUFL Time series')
adf_test(df_train['LUFL'])

print('\n\nADF Test: ETT-small_LULL Time series')
adf_test(df_train['LULL'])

print('\n\nADF Test: ETT-small_OT Time series')
```

```
adf_test(df_train['OT'])
```

```
ADF Test: ETT-small_HUFL Time series
ADF Statistics: -6.526431
p-value: 0.000000
Critical values:
        1%: -3.431
        5%: -2.862
        10%: -2.567


ADF Test: ETT-small_HULL Time series
ADF Statistics: -4.551678
p-value: 0.000158
Critical values:
        1%: -3.431
        5%: -2.862
        10%: -2.567


ADF Test: ETT-small_MUFL Time series
ADF Statistics: -4.044988
p-value: 0.001192
Critical values:
        1%: -3.431
        5%: -2.862
        10%: -2.567


ADF Test: ETT-small_MULL Time series
ADF Statistics: -4.458460
p-value: 0.000234
Critical values:
        1%: -3.431
        5%: -2.862
        10%: -2.567


ADF Test: ETT-small_LUFL Time series
ADF Statistics: -2.480396
p-value: 0.120317
Critical values:
        1%: -3.431
        5%: -2.862
        10%: -2.567


ADF Test: ETT-small_LULL Time series
```

```
ADF Statistics: -3.335933
p-value: 0.013347
Critical values:
        1%: -3.431
        5%: -2.862
        10%: -2.567


ADF Test: ETT-small_OT Time series
ADF Statistics: -3.610640
p-value: 0.005561
Critical values:
        1%: -3.431
        5%: -2.862
        10%: -2.567
```

1 LUFL 불통

[7]:
```
from statsmodels.tsa.stattools import kpss


def kpss_test(df):
    statistic, p_value, n_lags, critical_values = kpss(df.values)

    print(f'KPSS Statistic: {statistic}')
    print(f'p-value: {p_value}')
    print(f'num lags: {n_lags}')
    print('Critial Values:')
    for key, value in critical_values.items():
        print(f'{key} : {value}')

print('KPSS Test: ETT-small_HUFL Time series')
kpss_test(df_train['HUFL'])

print('\n\nKPSS Test: ETT-small_HULL Time series')
kpss_test(df_train['HULL'])

print('\n\nKPSS Test: ETT-small_MUFL Time series')
kpss_test(df_train['MUFL'])

print('\n\nKPSS Test: ETT-small_MULL Time series')
kpss_test(df_train['MULL'])

print('\n\nKPSS Test: ETT-small_LUFL Time series')
kpss_test(df_train['LUFL'])
```

```
print('\n\nKPSS Test: ETT-small_LULL Time series')
kpss_test(df_train['LULL'])

print('\n\nKPSS Test: ETT-small_OT Time series')
kpss_test(df_train['OT'])
```

```
KPSS Test: ETT-small_HUFL Time series
KPSS Statistic: 13.890657542827643
p-value: 0.01
num lags: 44
Critial Values:
10% : 0.347
5% : 0.463
2.5% : 0.574
1% : 0.739


KPSS Test: ETT-small_HULL Time series
KPSS Statistic: 21.164964520895357
p-value: 0.01
num lags: 44
Critial Values:
10% : 0.347
5% : 0.463
2.5% : 0.574
1% : 0.739


KPSS Test: ETT-small_MUFL Time series
KPSS Statistic: 2.0766731412638357
p-value: 0.01
num lags: 44
Critial Values:
10% : 0.347
5% : 0.463
2.5% : 0.574
1% : 0.739


KPSS Test: ETT-small_MULL Time series
KPSS Statistic: 13.574525173152907
p-value: 0.01
num lags: 44
Critial Values:
10% : 0.347
5% : 0.463
2.5% : 0.574
1% : 0.739
```

```
KPSS Test: ETT-small_LUFL Time series
KPSS Statistic: 28.29255741438666
p-value: 0.01
num lags: 44
Critial Values:
10% : 0.347
5% : 0.463
2.5% : 0.574
1% : 0.739


KPSS Test: ETT-small_LULL Time series
KPSS Statistic: 1.8462831859734243
p-value: 0.01
num lags: 44
Critial Values:
10% : 0.347
5% : 0.463
2.5% : 0.574
1% : 0.739


KPSS Test: ETT-small_OT Time series
KPSS Statistic: 3.0782781532474415
p-value: 0.01
num lags: 44
Critial Values:
10% : 0.347
5% : 0.463
2.5% : 0.574
1% : 0.739

C:\ProgramData\Anaconda3\envs\muiiya\lib\site-
packages\statsmodels\tsa\stattools.py:1850: FutureWarning: The behavior of using
nlags=None will change in release 0.13.Currently nlags=None is the same as
nlags="legacy", and so a sample-size lag length is used. After the next release,
the default will change to be the same as nlags="auto" which uses an automatic
lag length selection method. To silence this warning, either use "auto" or
"legacy"
  warnings.warn(msg, FutureWarning)
C:\ProgramData\Anaconda3\envs\muiiya\lib\site-
packages\statsmodels\tsa\stattools.py:1881: InterpolationWarning: The test
statistic is outside of the range of p-values available in the
look-up table. The actual p-value is smaller than the p-value returned.

  warnings.warn(
```

```
C:\ProgramData\Anaconda3\envs\muiiya\lib\site-
packages\statsmodels\tsa\stattools.py:1881: InterpolationWarning: The test
statistic is outside of the range of p-values available in the
look-up table. The actual p-value is smaller than the p-value returned.

  warnings.warn(
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packages\statsmodels\tsa\stattools.py:1881: InterpolationWarning: The test
statistic is outside of the range of p-values available in the
look-up table. The actual p-value is smaller than the p-value returned.

  warnings.warn(
```

2 KPSS 불통

[ ]:

```

```