```
from google.colab import drive
drive.mount('/content/drive')
```

```
Drive already mounted at /content/drive; to attempt to forcibly remount, call drive.mount("/content/drive", force_remount=True).
```

```
#import libraries

import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
%matplotlib inline
```

```
file = '/content/drive/MyDrive/Colab Notebooks/HSDC Time series/Time_series_analysis_and_forecast_DATASET.csv'
electricity_file = pd.read_csv(file)
```

```
electricity_file.head()
```

	FullDate	Tmax	SysLoad	GasPrice	ElecPrice
0	2010-09-01 00:00:00	15.8	1688.215	3.69	23.710
1	2010-09-01 01:00:00	15.8	1669.195	3.69	22.635
2	2010-09-01 02:00:00	15.8	1491.980	3.69	22.565
3	2010-09-01 03:00:00	15.8	1330.760	3.69	18.910
4	2010-09-01 04:00:00	15.8	1247.940	3.69	18.030

```
electricity_file.shape
```

```
(92016, 5)
```

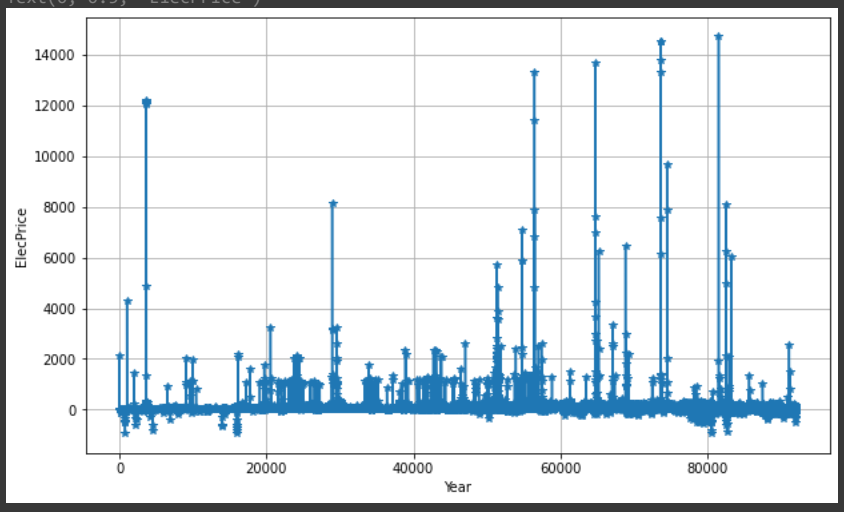
```
electricity_file.isnull().values.any()
```

```
False
```

```
electricity_file["FullDate"] = pd.to_datetime(electricity_file["FullDate"])
electricity_file.set_index("FullDate", inplace=True)
```

```
plt.figure(figsize=(10,6))
plt.plot(electricity_file.index, electricity_file.ElecPrice, marker='*')
plt.grid()
plt.xlabel('Year')
plt.ylabel('ElecPrice')
```

```
Text(0, 0.5, 'ElecPrice')
```




```
#Resample data to a daily frequency and sum
electricity_file = electricity_file.resample('D').sum()
```

```
electricity_file
```

FullDate	Tmax	SysLoad	GasPrice	ElecPrice
2010-09-01	379.2	41565.38000	88.5600	2751.700
2010-09-02	369.6	38898.99000	88.5600	570.810
2010-09-03	439.2	41665.76000	106.8000	504.975
2010-09-04	328.8	35638.08500	81.3600	502.275
2010-09-05	357.6	35611.41000	106.8000	500.555
...	...	...	...	...
2021-02-24	537.6	-1525.49745	134.4000	634.770
2021-02-25	518.4	4539.07855	130.5048	577.515
2021-02-26	547.2	9517.02430	130.1808	1445.495
2021-02-27	564.0	4932.88015	130.0800	488.980

```
train = electricity_file[0:2757]
test = electricity_file[2757:]
```

```
train.shape
```

```
(2757, 5)
```

```
!pip install pystan~=2.14
!pip install fbprophet
```

```
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/public/simple/
Collecting pystan~=2.14
  Downloading pystan-2.19.1.1-cp38-cp38-manylinux1_x86_64.whl (62.6 MB)
     ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 62.6/62.6 MB 12.8 MB/s eta 0:00:00
Requirement already satisfied: Cython!=0.25.1,>=0.22 in /usr/local/lib/python3.8/dist-packages (from pystan~=2.14) (0.29.33)
Requirement already satisfied: numpy>=1.7 in /usr/local/lib/python3.8/dist-packages (from pystan~=2.14) (1.21.6)
Installing collected packages: pystan
  Attempting uninstall: pystan
    Found existing installation: pystan 3.3.0
    Uninstalling pystan-3.3.0:
      Successfully uninstalled pystan-3.3.0
Successfully installed pystan-2.19.1.1
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-wheels/public/simple/
Collecting fbprophet
  Downloading fbprophet-0.7.1.tar.gz (64 kB)
     ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 64.0/64.0 KB 6.4 MB/s eta 0:00:00
  Preparing metadata (setup.py) ... done
Requirement already satisfied: Cython>=0.22 in /usr/local/lib/python3.8/dist-packages (from fbprophet) (0.29.33)
Collecting cmdstanpy==0.9.5
  Downloading cmdstanpy-0.9.5-py3-none-any.whl (37 kB)
Requirement already satisfied: pystan>=2.14 in /usr/local/lib/python3.8/dist-packages (from fbprophet) (2.19.1.1)
Requirement already satisfied: numpy>=1.15.4 in /usr/local/lib/python3.8/dist-packages (from fbprophet) (1.21.6)
Requirement already satisfied: pandas>=1.0.4 in /usr/local/lib/python3.8/dist-packages (from fbprophet) (1.3.5)
Requirement already satisfied: matplotlib>=2.0.0 in /usr/local/lib/python3.8/dist-packages (from fbprophet) (3.2.2)
Requirement already satisfied: LunarCalendar>=0.0.9 in /usr/local/lib/python3.8/dist-packages (from fbprophet) (0.0.9)
Requirement already satisfied: convertdate>=2.1.2 in /usr/local/lib/python3.8/dist-packages (from fbprophet) (2.4.0)
Requirement already satisfied: holidays>=0.10.2 in /usr/local/lib/python3.8/dist-packages (from fbprophet) (0.18)
Requirement already satisfied: setuptools-git>=1.2 in /usr/local/lib/python3.8/dist-packages (from fbprophet) (1.2)
Requirement already satisfied: python-dateutil>=2.8.0 in /usr/local/lib/python3.8/dist-packages (from fbprophet) (2.8.2)
Requirement already satisfied: tqdm>=4.36.1 in /usr/local/lib/python3.8/dist-packages (from fbprophet) (4.64.1)
Requirement already satisfied: pymeeus<=1,>=0.3.13 in /usr/local/lib/python3.8/dist-packages (from convertdate>=2.1.2->fbprophet) (0.5.12)
Requirement already satisfied: hijri-converter in /usr/local/lib/python3.8/dist-packages (from holidays>=0.10.2->fbprophet) (2.2.4)
Requirement already satisfied: korean-lunar-calendar in /usr/local/lib/python3.8/dist-packages (from holidays>=0.10.2->fbprophet) (0.3.1)
Requirement already satisfied: ephem>=3.7.5.3 in /usr/local/lib/python3.8/dist-packages (from LunarCalendar>=0.0.9->fbprophet) (4.1.4)
Requirement already satisfied: pytz in /usr/local/lib/python3.8/dist-packages (from LunarCalendar>=0.0.9->fbprophet) (2022.7)
Requirement already satisfied: cycler>=0.10 in /usr/local/lib/python3.8/dist-packages (from matplotlib>=2.0.0->fbprophet) (0.11.0)
Requirement already satisfied: pyparsing!=2.0.4,!=2.1.2,!=2.1.6,>=2.0.1 in /usr/local/lib/python3.8/dist-packages (from matplotlib>=2.0.0->fbprophet)
Requirement already satisfied: kiwisolver>=1.0.1 in /usr/local/lib/python3.8/dist-packages (from matplotlib>=2.0.0->fbprophet) (1.4.4)
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.8/dist-packages (from python-dateutil>=2.8.0->fbprophet) (1.15.0)
Building wheels for collected packages: fbprophet
  Building wheel for fbprophet (setup.py) ... done
  Created wheel for fbprophet: filename=fbprophet-0.7.1-py3-none-any.whl size=9535951 sha256=02cd1789cdd534f74ea647a5ff03251c2e346d97400a48f4153c21680c
  Stored in directory: /root/.cache/pip/wheels/d0/d2/ae/c579b7fd160999d35908f3cb8ebcad7ef64ecaca7b78e4c3c8
Successfully built fbprophet
Installing collected packages: cmdstanpy, fbprophet
  Attempting uninstall: cmdstanpy
    Found existing installation: cmdstanpy 1.0.8
    Uninstalling cmdstanpy-1.0.8:
      Successfully uninstalled cmdstanpy-1.0.8
ERROR: pip's dependency resolver does not currently take into account all the packages that are installed. This behaviour is the source of the followir
prophet 1.1.1 requires cmdstanpy>=1.0.4, but you have cmdstanpy 0.9.5 which is incompatible.
Successfully installed cmdstanpy-0.9.5 fbprophet-0.7.1
```

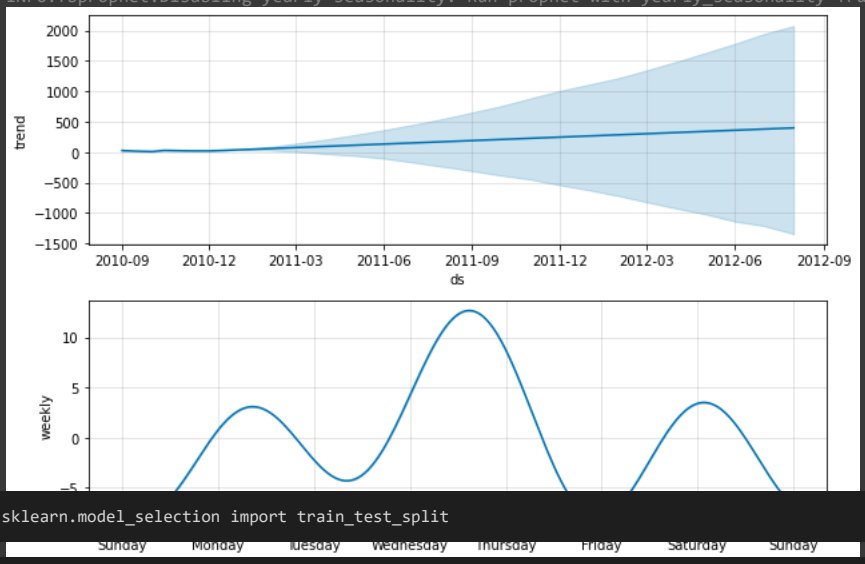
```
from fbprophet import Prophet
```

```
train = train.rename(columns={"FullDate": "ds", "ElecPrice": "y"})
train.head()
```

	ds	Tmax	SysLoad	GasPrice	y
0	2010-09-01 00:00:00	15.8	1688.215	3.69	23.710
1	2010-09-01 01:00:00	15.8	1669.195	3.69	22.635
2	2010-09-01 02:00:00	15.8	1491.980	3.69	22.565
3	2010-09-01 03:00:00	15.8	1330.760	3.69	18.910
4	2010-09-01 04:00:00	15.8	1247.940	3.69	18.030

```
def SysLoad(ds):
  date = pd.to_datetime(ds)
  if date.weekday() == 6 and (date.month > 8 or date.month < 2):
    return 1
  else:
    return 0

def Tmax(ds):
  date = pd.to_datetime(ds)
  if date.weekday() == 6 and (date.month > 8 or date.month < 2):
    return 1
  else:
    return 0

def GasPrice(ds):
  date = pd.to_datetime(ds)
  if date.weekday() == 6 and (date.month > 8 or date.month < 2):
    return 1
  else:
    return 0
train['add1'] = train['ds'].apply(SysLoad)
train['add2'] = train['ds'].apply(Tmax)
train['add3'] = train['ds'].apply(GasPrice)

model = Prophet()
model.add_regressor('SysLoad')

model.add_regressor('Tmax')

model.add_regressor('GasPrice')

model.fit(train)

future = model.make_future_dataframe(periods= 20 , freq= 'M' )
future['SysLoad'] = future['ds'].apply(SysLoad)
future['Tmax'] = future['ds'].apply(Tmax)
future['GasPrice'] = future['ds'].apply(GasPrice)

forecast = model.predict(future)
fig = model.plot_components(forecast)
```

```
INFO:fbprophet:Disabling yearly seasonality. Run prophet with yearly_seasonality=True to override
```




```
from sklearn.model_selection import train_test_split
```

```
def rmse(predictions, targets):
    differences = predictions - targets
    differences_squared = differences ** 2
    mean_of_differences_squared = np.mean(differences_squared)
    rmse_val = np.sqrt(mean_of_differences_squared)
    return rmse_val
```