!apt-get install tree

Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
tree is already the newest version (2.0.2-1).
0 upgraded, 0 newly installed, 0 to remove and 18 not upgraded.

▼ preprocesses of dataset

Double-click (or enter) to edit

import libraries

import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from statsmodels.tsa.arima.model import ARIMA
from sklearn.metrics import mean_squared_error

load the dataset

df=pd.read_csv("/content/Electricity (1) (1).csv")

<ipython-input-79-686a806222b2>:1: DtypeWarning: Columns (9,10,11,14,15,16,17) have mixed types. Specify dtype option on import or set l
df=pd.read_csv("/content/Electricity (1) (1).csv")

df

	DateTime	Holiday	HolidayFlag	Day0fWeek	WeekOfYear	Day	Month	Year	PeriodOfDay	ForecastWindProduction	SystemLoadEA	SMPEA
0	01/11/2011 00:00	None	0	1	44	1	11	2011	0	315.31	3388.77	49.26
1	01/11/2011 00:30	None	0	1	44	1	11	2011	1	321.80	3196.66	49.26
2	01/11/2011 01:00	None	0	1	44	1	11	2011	2	328.57	3060.71	49.10
3	01/11/2011 01:30	None	0	1	44	1	11	2011	3	335.60	2945.56	48.04
4	01/11/2011 02:00	None	0	1	44	1	11	2011	4	342.90	2849.34	33.75
	•••			•••								
38009	31/12/2013 21:30	New Year's Eve	1	1	1	31	12	2013	43	1179.14	3932.22	34.51
38010	31/12/2013 22:00	New Year's Eve	1	1	1	31	12	2013	44	1152.01	3821.44	33.83
38011	31/12/2013 22:30	New Year's Eve	1	1	1	31	12	2013	45	1123.67	3724.21	31.75
38012	31/12/2013 23:00	New Year's Eve	1	1	1	31	12	2013	46	1094.24	3638.16	33.83
38013	31/12/2013 23:30	New Year's Eve	1	1	1	31	12	2013	47	1064.0	3624.25	33.83

38014 rows × 18 columns

df.head

```
<bound method NDFrame.head of</pre>
                                              DateTime
                                                               Holiday HolidayFlag DayOfWeek WeekOfYear \
       01/11/2011 00:00
0
                                   None
                                                    0
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2
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       01/11/2011 01:30
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4
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38009 31/12/2013 21:30
                         New Year's Eve
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38010 31/12/2013 22:00
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38011 31/12/2013 22:30 New Year's Eve
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38013 31/12/2013 23:30 New Year's Eve
            Month Year
                        PeriodOfDay ForecastWindProduction SystemLoadEA \
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2
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                                                      328.57
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3
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                                                                  2945.56
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                                                                  2849.34
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                                                     1152.01
                                                                  3821.44
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                                                     1123.67
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                                                                  3624.25
       {\tt SMPEA~ORKTemperature~ORKWindspeed~CO2Intensity~ActualWindProduction~~\backslash}
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38010 33.83
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38011
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38012 33.83
                       5.00
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                                                                     1020.0
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      SystemLoadEP2 SMPEP2
0
            3159.60 54.32
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            2973.01
                     54.23
            2834.00 54.23
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                     53.47
3
            2655.64 39.87
4
38009
            3692.95 42.45
38010
             3571.0 33.83
38011
            3460.29 31.75
38012
            3563.99
                      50.6
38013
            3517.08
                      34.9
[38014 rows x 18 columns]>
```

read the last 10 columns

df.tail

<bound< td=""><td>meth</td><td>nod NDFr</td><td>rame.ta</td><td>il of</td><td>DateTime</td><td>Holiday</td><td>HolidayFlag</td><td>DayOfWeek</td><td>WeekOfYear</td><td>\</td></bound<>	meth	nod NDFr	rame.ta	il of	DateTime	Holiday	HolidayFlag	DayOfWeek	WeekOfYear	\
0	01/1	1/2011	00:00	None	0	1	44			
1	01/1	1/2011	00:30	None	0	1	44			
2	01/1	1/2011	01:00	None	0	1	44			
3	01/1	1/2011	01:30	None	0	1	44			
4	01/1	1/2011	02:00	None	0	1	44			
					• • •					
38009	31/1	12/2013	21:30	New Year's Eve	1	1	1			
38010	31/1	12/2013	22:00	New Year's Eve	1	1	1			
38011	31/1	12/2013	22:30	New Year's Eve	1	1	1			
38012	31/1	12/2013	23:00	New Year's Eve	1	1	1			
38013	31/1	12/2013	23:30	New Year's Eve	1	1	1			
	Day	Month	Year	PeriodOfDay Fore	castWindProduction	SystemLoad	dEA \			
0	1	11	2011	0	315.31	3388	.77			
1	1	11	2011	1	321.80	3196	.66			
2	1	11	2011	2	328.57	3060	.71			
3	1	11	2011	3	335.60	2945	. 56			
4	1	11	2011	4	342.90	2849	. 34			

```
38013 33.83
                               5.00
              SystemLoadEP2 SMPEP2
        0
                    3159.60 54.32
                    2973.01 54.23
https://colab.research.google.com/drive/1AlqOGqicdhXeTAu 7iz sUwKh5SLXQmM?authuser=0#scrollTo=8Hq-yZtl mhW&uniqifier=1&printMode=true
```

16.70

308.01

1020.0

3/8

```
2834.00 54.23
                       2725.99 53.47
       3
       4
                       2655.64 39.87
                       3692.95 42.45
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       38010
                        3571.0 33.83
       38011
                       3460.29 31.75
       38012
                       3563.99
                                   50.6
                       3517.08 34.9
       38013
       [38014 rows x 18 columns]>
df.columns
       Index(['DateTime', 'Holiday', 'HolidayFlag', 'DayOfWeek', 'WeekOfYear', 'Day',
                'Month', 'Year', 'PeriodofDay', 'ForecastWindProduction',
'SystemLoadEA', 'SMPEA', 'ORKTemperature', 'ORKWindspeed',
'CO2Intensity', 'ActualWindProduction', 'SystemLoadEP2', 'SMPEP2'],
               dtype='object')
```

check the null values

df.isnull

```
<bound method DataFrame.isnull of</pre>
                                                 {\tt DateTime}
                                                                  Holiday HolidayFlag DayOfWeek WeekOfYear \
       01/11/2011 00:00
                                   None
                                                  0
                                                             1
       01/11/2011 00:30
                                   None
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2
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38009 31/12/2013 21:30
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38010 31/12/2013 22:00 New Year's Eve
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                        PeriodOfDay ForecastWindProduction SystemLoadEA \
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                                                    335.60
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                   2011
                                  4
                                                    342.90
                                                                 2849.34
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38009
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              12 2013
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38012
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              12 2013
                                 46
                                                                 3638.16
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                                                    1064.0
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      49.10
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3
      48.04
                      6.00
                                   9.30
                                               585.94
                                                                    313.00
      33.75
                      6.00
                                                                    346.00
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                                              571.52
38009 34.51
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                                               285.31
                                                                     812.0
38010 33.83
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                                   24.10
                                               278.31
                                                                     852.0
38011 31.75
                      4.00
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                                               280.91
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                                   14.80
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           2725.99
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           2655.64 39.87
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            3692.95 42.45
38010
            3571.0 33.83
            3460.29 31.75
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38012
            3563.99
                     50.6
38013
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[38014 rows x 18 columns]>
```

df.isnull().sum

```
<bound method NDFrame._add_numeric_operations.<locals>.sum of
                                                                     DateTime Holiday HolidayFlag DayOfWeek WeekOfYear
                                                                                                                              Day
Month \
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        Year PeriodOfDay ForecastWindProduction SystemLoadEA SMPEA \
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38012
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38013 False
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       ORKTemperature ORKWindspeed CO2Intensity ActualWindProduction
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                False
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38013
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      SystemLoadEP2 SMPEP2
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38009
              False
                       False
38010
               False
38011
              False
                       False
38012
              False
                       False
38013
              False
                      False
[38014 rows x 18 columns]>
```

df.dropna()

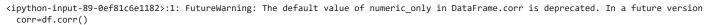
 ${\tt WeekOfYear\ Day\ Month\ Year\ PeriodOfDay\ ForecastWindProduction\ SystemLoadEA\ SMPEA}$

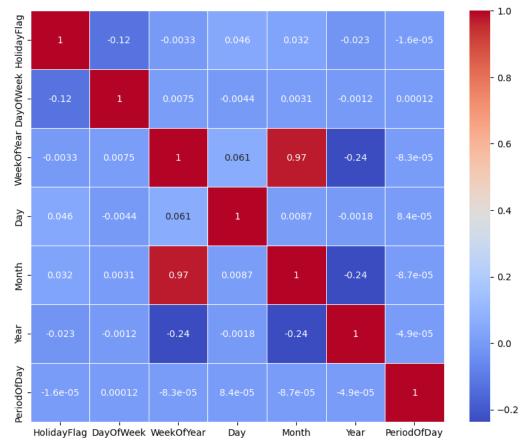
					44	1	11	2011	0		315.31	3388.77	49
					44	1	11	2011	1		321.80	3196.66	4
					44	1	11	2011	2		328.57	3060.71	4
					44	ı	11	2011	2		320.37	3000.71	4
					44	1	11	2011	3		335.60	2945.56	4
					44	1	11	2011	4		342.90	2849.34	3
illna													
<bound< td=""><td>l method DataFr</td><td>rame.f:</td><td>illna of</td><td>DateTime</td><td></td><td>Holi</td><td>iday</td><td>HolidayFlag</td><td>DayOfWeek</td><td>WeekOfYear</td><td>\</td><td></td><td></td></bound<>	l method DataFr	rame.f:	illna of	DateTime		Holi	iday	HolidayFlag	DayOfWeek	WeekOfYear	\		
0	01/11/2011 00		None	0	1		44						
1	01/11/2011 00		None	0	1		44						
2	01/11/2011 01		None	0	1		44						
3	01/11/2011 01		None	0	1		44						
4	01/11/2011 02		None	0	1		44						
29000	21/12/2012 24		Now Year's Eve										
38009	31/12/2013 21 31/12/2013 22		New Year's Eve	1 1	1 1		1	l 1					
38010			New Year's Eve										
38011 38012	31/12/2013 22 31/12/2013 23		New Year's Eve New Year's Eve	1 1	1 1			1 1					
	31/12/2013 23		New Year's Eve	1	1			1					
	,,			_	_			_					
	Day Month Y	/ear	PeriodOfDay Forecas	tWindProductic	n Syst	emLoad	dEA \	\					
0	1 11 2	2011	0	315.3	1	3388.	.77						
1	1 11 2	2011	1	321.8	0	3196.	.66						
2	1 11 2	2011	2	328.5	7	3060.	.71						
3	1 11 2	2011	3	335.6	0	2945.	.56						
4	1 11 2	2011	4	342.9	10	2849.	.34						
• • •	• • • • • • • • • • • • • • • • • • • •	• • •	•••				• • •						
38009		2013	43	1179.1		3932.							
38010		2013	44	1152.0		3821.							
38011		2013	45	1123.6		3724.							
38012		2013	46	1094.2		3638.							
38013	31 12 2	2013	47	1064.	0	3624.	. 25						
	SMPEA ORKTemp	eratu	re ORKWindspeed CO2	Intensity Actu	ıalWinc	lProduc	tion	\					
0	49.26	6.6		600.71			6.00						
1	49.26												
1		6.6	00 11.10	605.42		31	L7.00						
2	49.10	5.6					L7.00 L1.00						
			00 11.10	605.42 589.97 585.94		31							
2	49.10	5.6	00 11.10 00 9.30	589.97		31 31	11.00						
2 3	49.10 48.04	5.6 6.6	00 11.10 00 9.30	589.97 585.94		31 31 34	11.00 13.00 16.00						
2 3 4 38009	49.10 48.04 33.75 34.51	5.6 6.6 6.6	00 11.10 00 9.30 00 11.10 00 22.20	589.97 585.94 571.52 285.31		31 31 34	11.00 13.00 16.00 312.0						
2 3 4 38009 38010	49.10 48.04 33.75 34.51 33.83	5.6 6.6	00 11.10 00 9.30 00 11.10 00 22.20	589.97 585.94 571.52 285.31 278.31		31 31 34 8	11.00 13.00 16.00 312.0 352.0						
2 3 4 38009 38010 38011	49.10 48.04 33.75 34.51 33.83 31.75	5.6 6.6 6.6 5.6	00 11.10 00 9.30 00 11.10 00 22.20 00 24.10 00 20.40	589.97 585.94 571.52 285.31 278.31 280.91		31 31 34 8 8	11.00 13.00 16.00 312.0 352.0 962.0						
2 3 4 38009 38010 38011 38012	49.10 48.04 33.75 34.51 33.83 31.75 33.83	5.6 6.6 6.6 5.6 4.6	00 11.10 00 9.30 00 11.10 00 22.20 00 24.10 00 20.40 00 14.80	589.97 585.94 571.52 285.31 278.31 280.91 302.46		31 31 34 8 8	11.00 13.00 16.00 312.0 352.0 962.0						
2 3 4 38009 38010 38011 38012	49.10 48.04 33.75 34.51 33.83 31.75	5.6 6.6 6.6 5.6	00 11.10 00 9.30 00 11.10 00 22.20 00 24.10 00 20.40 00 14.80	589.97 585.94 571.52 285.31 278.31 280.91		31 31 34 8 8	11.00 13.00 16.00 312.0 352.0 962.0						
2 3 4 38009 38010 38011 38012 38013	49.10 48.04 33.75 34.51 33.83 31.75 33.83 33.83	5.6 6.6 6.6 5.6 4.6 5.6	00 11.10 00 9.30 00 11.10 00 22.20 00 24.10 00 20.40 00 14.80 00 16.70	589.97 585.94 571.52 285.31 278.31 280.91 302.46		31 31 34 8 8	11.00 13.00 16.00 312.0 352.0 962.0						
2 3 4 38009 38010 38011 38012 38013	49.10 48.04 33.75 34.51 33.83 31.75 33.83 33.83 SystemLoadEP2	5.6 6.6 6.6 5.6 4.6 5.6 5.6	00 11.10 00 9.30 00 11.10 00 22.20 00 24.10 00 20.40 00 14.80 00 16.70	589.97 585.94 571.52 285.31 278.31 280.91 302.46		31 31 34 8 8	11.00 13.00 16.00 312.0 352.0 962.0						
2 3 4 38009 38010 38011 38012 38013	49.10 48.04 33.75 34.51 33.83 31.75 33.83 33.83 SystemLoadEP2 3159.60	5.6 6.6 6.6 5.6 4.6 5.6 5.6 5.6	00 11.10 00 9.30 00 11.10 00 22.20 00 24.10 00 20.40 00 14.80 00 16.70	589.97 585.94 571.52 285.31 278.31 280.91 302.46		31 31 34 8 8	11.00 13.00 16.00 312.0 352.0 962.0						
2 3 4 38009 38010 38011 38012 38013	49.10 48.04 33.75 34.51 33.83 31.75 33.83 33.83 SystemLoadEP2 3159.60 2973.01	5.6 6.6 6.6 5.6 4.6 5.6 5.6 5.6 54.3 54.3	00	589.97 585.94 571.52 285.31 278.31 280.91 302.46		31 31 34 8 8	11.00 13.00 16.00 312.0 352.0 962.0						
2 3 4 38009 38010 38011 38012 38013	49.10 48.04 33.75 34.51 33.83 31.75 33.83 33.83 SystemLoadEP2 3159.60 2973.01 2834.00	5.6 6.6 6.6 5.6 4.6 5.6 5.6 5.6 54.3 54.2 54.2	00	589.97 585.94 571.52 285.31 278.31 280.91 302.46		31 31 34 8 8	11.00 13.00 16.00 312.0 352.0 962.0						
2 3 4 38009 38010 38011 38012 38013	49.10 48.04 33.75 34.51 33.83 31.75 33.83 33.83 SystemLoadEP2 3159.60 2973.01	5.6 6.6 6.6 5.6 4.6 5.6 5.6 5.6 54.3 54.2 54.2 54.2 53.4	00	589.97 585.94 571.52 285.31 278.31 280.91 302.46		31 31 34 8 8	11.00 13.00 16.00 312.0 352.0 962.0						
2 3 4 38009 38010 38011 38012 38013	49.10 48.04 33.75 34.51 33.83 31.75 33.83 33.83 SystemLoadEP2 3159.60 2973.01 2834.00 2725.99 2655.64	5.6 6.6 6.6 5.6 4.6 5.6 5.6 5.6 54.2 54.2 54.2 53.4 39.8	00	589.97 585.94 571.52 285.31 278.31 280.91 302.46		31 31 34 8 8	11.00 13.00 16.00 312.0 352.0 962.0						
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▼ Feature engineering

label encoding

heatmap





convert float to numeric

```
def clean_column(column):
```

return column

```
# Apply the clean_column function to the affected columns
columns_to_clean = ['ForecastWindProduction', 'SMPEA','SystemLoadEA','SystemLoadEP2','ORKWindspeed','CO2Intensity','SMPEP2'] # Replace with if
for column in columns_to_clean:
    df[column] = clean_column(df[column])
```

Fill NaN values with the mean or other appropriate strategies df.fillna(df.mean(), inplace=True)

<ipython-input-119-7dc0e84b08d9>:12: FutureWarning: The default value of numeric_only in DataFrame.mean is deprecated. In a future versi
 df.fillna(df.mean(), inplace=True)

specify target variabes and feature variables

```
target_variable = 'SystemLoadEA' # Replace with your target variable
feature_columns = ['ForecastWindProduction', 'CO2Intensity', 'ActualWindProduction', 'SystemLoadEP2', 'SMPEP2']
```

split the dataset

```
from sklearn.model_selection import train_test_split
from pandas.core.groupby.generic import DataFrameGroupBy
# Define training and testing sets
X = df[feature_columns]
y = df[target_variable]
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)
\label{lem:def} {\tt df["ForecastWindProduction"] = pd.to\_numeric(df["ForecastWindProduction"], errors= 'coerce')} \\
df["SystemLoadEA"] = pd.to_numeric(df["SystemLoadEA"], errors= 'coerce')
df["SMPEA"] = pd.to_numeric(df["SMPEA"], errors= 'coerce')
df["ORKTemperature"] = pd.to_numeric(df["ORKTemperature"], errors= 'coerce')
df["ORKWindspeed"] = pd.to_numeric(df["ORKWindspeed"], errors= 'coerce')
df["CO2Intensity"] = pd.to_numeric(df["CO2Intensity"], errors= 'coerce')
df["ActualWindProduction"] = pd.to_numeric(df["ActualWindProduction"], errors= 'coerce')
df["SystemLoadEP2"] = pd.to_numeric(df["SystemLoadEP2"], errors= 'coerce')
df["SMPEP2"] = pd.to_numeric(df["SMPEP2"], errors= 'coerce')
implement random forest algorithmn
from sklearn.ensemble import RandomForestRegressor
model = RandomForestRegressor()
model.fit(X_train,y_train)
      ▼ RandomForestRegressor
     RandomForestRegressor()
sample features
features = np.array([[10, 12, 54.10, 4241.05, 49.56]])
model.predict(features)
     /usr/local/lib/python3.10/dist-packages/sklearn/base.py:439: UserWarning: X does not have valid feature names, but RandomForestRegressor
       warnings.warn(
     array([4284.7246])
```