

# M24A

## \_Xarxa\_walkforard\_normalitzat\_multivariate2tempmin\_weekday\_14d

### walkforwardaugment-ACORN

December 21, 2019

## 1 Xarxa neuronal

```
In [1]: import pandas as pd
import numpy as np
from pandas import datetime
from matplotlib import pyplot as plt

import keras
from keras.models import Sequential
from keras.layers import Dense
from keras.layers import LSTM

from keras.optimizers import SGD
from sklearn.model_selection import StratifiedKFold
from scipy.stats import uniform as sp_rand
from scipy.stats import randint
from time import time
from sklearn import preprocessing
```

Using TensorFlow backend.

### 1.1 Consum diari total multivariate one-step ACORN A

```
In [8]: daily=pd.read_csv('C:/Users/Laura/Desktop/Smart meters London/workspace R/Dades netes/1
daily.head(5)
```

```
Out[8]:
```

	date	Acorn	apparentTemperatureMax	apparentTemperatureMin	\
0	2014-02-08	ACORN-A	5.67	2.19	
1	2014-02-08	ACORN-B	5.67	2.19	
2	2014-02-08	ACORN-C	5.67	2.19	
3	2014-02-08	ACORN-D	5.67	2.19	
4	2014-02-08	ACORN-E	5.67	2.19	

	sunsetTimeHour	weekday	season	cloudCover	humidity	visibility	month	\
0	17	6	winter	0.47	0.77	11.2	2	
1	17	6	winter	0.47	0.77	11.2	2	
2	17	6	winter	0.47	0.77	11.2	2	
3	17	6	winter	0.47	0.77	11.2	2	
4	17	6	winter	0.47	0.77	11.2	2	

	dewPoint	pressure	energy_sum
0	3.99	979.25	21.177479
1	3.99	979.25	14.272522
2	3.99	979.25	13.453755
3	3.99	979.25	14.648183
4	3.99	979.25	12.152703

```
In [9]: daily_dia=daily[daily.Acorn=='ACORN-A']
daily_dia
```

```
Out [9]:
```

	date	Acorn	apparentTemperatureMax	apparentTemperatureMin	\
0	2014-02-08	ACORN-A	5.67	2.19	
18	2013-12-24	ACORN-A	11.93	2.68	
36	2012-11-01	ACORN-A	11.46	0.85	
54	2014-02-05	ACORN-A	5.86	1.03	
72	2012-04-17	ACORN-A	10.01	2.76	
90	2012-04-18	ACORN-A	8.05	3.41	
108	2013-12-25	ACORN-A	4.98	0.23	
126	2014-02-09	ACORN-A	3.91	1.38	
144	2014-01-28	ACORN-A	6.34	1.96	
162	2012-12-14	ACORN-A	10.34	-0.92	
180	2013-12-27	ACORN-A	10.99	3.68	
198	2011-12-16	ACORN-A	0.99	-2.65	
214	2012-04-24	ACORN-A	11.94	2.27	
232	2014-02-15	ACORN-A	5.79	1.77	
250	2014-02-07	ACORN-A	8.44	-0.86	
268	2012-09-24	ACORN-A	15.47	7.49	
286	2012-09-23	ACORN-A	15.20	11.51	
304	2014-01-27	ACORN-A	4.34	-2.02	
322	2014-02-06	ACORN-A	7.34	1.96	
340	2012-10-31	ACORN-A	12.36	4.43	
358	2012-04-09	ACORN-A	12.90	2.80	
376	2014-02-01	ACORN-A	6.86	1.10	
394	2011-12-13	ACORN-A	12.08	0.22	
409	2014-02-14	ACORN-A	12.02	0.45	
427	2013-03-17	ACORN-A	5.13	-0.32	
445	2014-01-16	ACORN-A	10.72	3.91	
463	2014-01-17	ACORN-A	5.71	2.83	
481	2013-03-18	ACORN-A	7.06	-1.32	
499	2012-11-02	ACORN-A	6.88	1.81	
517	2012-12-15	ACORN-A	11.17	4.32	

...	...	...	...	...
14202	2011-12-26	ACORN-A	12.91	6.91
14219	2012-01-10	ACORN-A	11.29	7.25
14236	2012-03-25	ACORN-A	13.79	2.47
14254	2013-12-02	ACORN-A	8.79	6.24
14272	2013-11-27	ACORN-A	10.32	4.12
14290	2012-03-21	ACORN-A	15.62	5.38
14308	2013-02-27	ACORN-A	2.67	-1.82
14326	2012-02-12	ACORN-A	2.73	-6.26
14344	2012-03-13	ACORN-A	10.89	4.71
14362	2013-11-28	ACORN-A	9.38	7.97
14380	2012-03-09	ACORN-A	10.86	4.48
14398	2012-03-20	ACORN-A	14.48	1.97
14416	2012-03-12	ACORN-A	13.86	4.46
14434	2013-01-05	ACORN-A	10.66	5.76
14452	2012-02-02	ACORN-A	-3.78	-6.49
14470	2012-02-04	ACORN-A	-2.32	-5.90
14488	2012-03-25	ACORN-A	18.18	2.40
14506	2012-03-26	ACORN-A	18.26	4.77
14524	2012-03-10	ACORN-A	15.39	6.66
14542	2012-05-11	ACORN-A	14.44	3.24
14560	2012-02-11	ACORN-A	1.93	-5.64
14578	2012-03-11	ACORN-A	15.55	6.04
14596	2013-01-04	ACORN-A	10.79	5.70
14614	2013-11-25	ACORN-A	4.63	1.89
14632	2012-02-10	ACORN-A	-0.54	-5.24
14650	2013-11-26	ACORN-A	5.77	1.08
14668	2012-02-03	ACORN-A	-1.67	-5.77
14686	2012-02-09	ACORN-A	1.79	-3.70
14704	2012-02-07	ACORN-A	1.92	-7.99
14722	2012-02-08	ACORN-A	-3.19	-6.87

	sunsetTimeHour	weekday	season	cloudCover	humidity	visibility	\
0	17	6	winter	0.47	0.77	11.20	
18	15	2	winter	0.40	0.81	10.86	
36	16	4	autumn	0.44	0.85	12.54	
54	16	3	winter	0.73	0.77	10.91	
72	19	2	spring	0.60	0.87	11.86	
90	19	3	spring	0.67	0.91	10.70	
108	15	3	winter	0.03	0.85	12.36	
126	17	7	winter	0.52	0.66	12.71	
144	16	2	winter	0.61	0.83	11.94	
162	15	5	autumn	0.71	0.92	7.45	
180	15	5	winter	0.37	0.75	11.43	
198	15	5	autumn	0.70	0.88	10.96	
214	19	2	spring	0.57	0.88	11.22	
232	17	6	winter	0.35	0.69	12.38	
250	17	5	winter	0.63	0.79	10.85	

268	17	1	autumn	0.28	0.78	13.13
286	17	7	autumn	0.66	0.88	8.10
304	16	1	winter	0.38	0.79	12.68
322	16	4	winter	0.67	0.82	10.53
340	16	3	autumn	0.49	0.79	12.99
358	18	1	spring	0.37	0.70	13.18
376	16	6	winter	0.19	0.76	11.60
394	15	2	autumn	0.42	0.75	12.55
409	17	5	winter	0.67	0.81	11.17
427	18	7	winter	0.64	0.88	11.52
445	16	4	winter	0.58	0.83	11.72
463	16	5	winter	0.47	0.87	11.70
481	18	1	winter	0.50	0.91	7.97
499	16	5	autumn	0.23	0.77	12.96
517	15	6	autumn	0.39	0.86	13.15
...	...	...	...	...	...	...
14202	15	1	winter	0.81	0.84	13.23
14219	16	2	winter	0.72	0.87	12.42
14236	18	7	spring	0.39	0.78	9.00
14254	15	1	autumn	0.86	0.79	10.70
14272	15	3	autumn	0.88	0.89	6.76
14290	18	3	spring	0.47	0.67	12.60
14308	17	3	winter	0.69	0.83	8.92
14326	17	7	winter	0.59	0.88	4.91
14344	18	2	winter	0.79	0.86	6.08
14362	15	4	autumn	0.96	0.87	6.34
14380	17	5	winter	0.64	0.78	13.02
14398	18	2	winter	0.34	0.72	13.05
14416	18	1	winter	0.41	0.87	4.76
14434	16	6	winter	0.72	0.92	9.58
14452	16	4	winter	0.29	0.59	13.05
14470	16	6	winter	0.58	0.80	8.64
14488	18	7	spring	0.15	0.71	8.16
14506	18	1	spring	0.14	0.53	11.64
14524	17	6	winter	0.53	0.81	11.17
14542	19	5	spring	0.16	0.58	13.23
14560	17	6	winter	0.04	0.78	6.98
14578	17	7	winter	0.38	0.81	10.59
14596	16	5	winter	0.83	0.85	12.34
14614	16	1	autumn	0.73	0.77	12.17
14632	17	5	winter	0.47	0.81	8.38
14650	16	2	autumn	0.47	0.72	12.63
14668	16	5	winter	0.36	0.67	12.89
14686	17	4	winter	0.75	0.81	9.75
14704	17	2	winter	0.58	0.75	8.92
14722	17	3	winter	0.89	0.78	12.55

month dewPoint pressure energy\_sum

0	2	3.99	979.25	21.177479
18	12	5.42	979.52	23.204063
36	11	5.06	979.63	20.640911
54	2	4.06	982.20	20.563536
72	4	5.74	982.22	20.345103
90	4	6.34	984.05	20.825718
108	12	2.57	984.66	26.945782
126	2	0.82	984.71	22.644650
144	1	3.59	985.33	21.197113
162	12	5.46	985.82	25.087753
180	12	4.83	986.81	23.620627
198	12	1.60	988.10	15.795667
214	4	6.86	988.28	18.559333
232	2	2.95	988.63	20.084590
250	2	4.16	988.77	20.211364
268	9	8.56	988.79	19.253322
286	9	11.14	989.47	20.862158
304	1	1.44	989.87	22.459621
322	2	4.96	989.90	20.609100
340	10	6.24	989.93	20.630478
358	4	3.93	990.03	19.561500
376	2	3.18	990.08	21.769440
394	12	3.62	990.27	15.194000
409	2	3.99	990.31	21.780493
427	3	3.16	990.34	23.263682
445	1	6.13	990.50	20.643014
463	1	5.32	990.80	20.255493
481	3	2.21	991.02	22.125331
499	11	2.96	991.25	20.318312
517	12	6.32	991.49	23.811253
...	...	...	...	...
14202	12	8.88	1033.14	23.246778
14219	1	7.92	1033.21	17.278500
14236	3	4.69	1033.50	18.692207
14254	12	4.41	1033.95	21.057653
14272	11	6.37	1033.95	20.644812
14290	3	4.93	1034.03	15.995885
14308	2	0.84	1034.17	21.204523
14326	2	-1.04	1034.52	20.526313
14344	3	5.45	1034.58	17.155773
14362	11	6.94	1034.64	20.374604
14380	3	5.51	1034.68	18.167450
14398	3	4.41	1034.75	16.527692
14416	3	6.53	1035.00	18.391190
14434	1	7.82	1035.16	22.888148
14452	2	-7.84	1035.76	17.260533
14470	2	-4.19	1036.05	18.723467
14488	3	4.30	1036.22	18.692207

14506	3	1.49	1036.33	16.745310
14524	3	8.37	1036.42	19.397300
14542	5	1.98	1036.68	15.023089
14560	2	-5.69	1036.81	18.959875
14578	3	7.37	1036.86	20.174100
14596	1	7.31	1037.15	21.460419
14614	11	2.08	1037.52	21.677097
14632	2	-3.39	1038.18	17.775125
14650	11	0.86	1038.71	20.755125
14668	2	-6.19	1039.19	17.886000
14686	2	-2.67	1039.26	17.169733
14704	2	-3.58	1039.95	16.162333
14722	2	-3.72	1040.92	17.810133

[820 rows x 14 columns]

In [10]: *#Agrupem per dia*

```
daily_dia["date"] = pd.to_datetime(daily_dia["date"], format='%Y-%m-%d')
daily_dia=daily_dia.resample('d', on='date').mean()
daily_dia
```

c:\users\laura\appdata\local\programs\python\python37\lib\site-packages\ipykernel\_launcher.py:

A value is trying to be set on a copy of a slice from a DataFrame.

Try using .loc[row\_indexer,col\_indexer] = value instead

See the caveats in the documentation: <http://pandas.pydata.org/pandas-docs/stable/indexing.html>

This is separate from the ipykernel package so we can avoid doing imports until

```
Out[10]:
```

date	apparentTemperatureMax	apparentTemperatureMin	sunsetTimeHour	\
2011-12-03	11.42	4.71	15	
2011-12-04	6.66	1.03	15	
2011-12-05	3.13	-1.69	15	
2011-12-06	3.77	-1.61	15	
2011-12-07	5.14	0.94	15	
2011-12-08	12.89	0.63	15	
2011-12-09	3.99	-1.42	15	
2011-12-10	3.14	-3.42	15	
2011-12-11	5.72	0.11	15	
2011-12-12	5.94	-0.64	15	
2011-12-13	12.08	0.22	15	
2011-12-14	2.88	0.78	15	
2011-12-15	4.38	1.07	15	
2011-12-16	0.99	-2.65	15	
2011-12-17	1.72	-3.56	15	
2011-12-18	1.98	-4.12	15	

2011-12-19	4.02	-3.67	15
2011-12-20	4.98	1.68	15
2011-12-21	12.14	3.84	15
2011-12-22	12.14	5.37	15
2011-12-23	11.44	0.99	15
2011-12-24	5.32	-0.51	15
2011-12-25	11.98	5.93	15
2011-12-26	12.91	6.91	15
2011-12-27	10.33	5.59	15
2011-12-28	11.19	1.84	15
2011-12-29	6.46	0.98	15
2011-12-30	10.27	1.71	16
2011-12-31	12.57	10.66	16
2012-01-01	12.59	4.86	16
...	...	...	...
2014-01-29	2.53	0.18	16
2014-01-30	5.86	0.61	16
2014-01-31	5.27	0.29	16
2014-02-01	6.86	1.10	16
2014-02-02	6.48	3.21	16
2014-02-03	4.59	1.96	16
2014-02-04	5.63	1.12	16
2014-02-05	5.86	1.03	16
2014-02-06	7.34	1.96	16
2014-02-07	8.44	-0.86	17
2014-02-08	5.67	2.19	17
2014-02-09	3.91	1.38	17
2014-02-10	7.07	0.89	17
2014-02-11	4.06	-0.57	17
2014-02-12	4.73	-1.20	17
2014-02-13	3.42	0.05	17
2014-02-14	12.02	0.45	17
2014-02-15	5.79	1.77	17
2014-02-16	7.88	-1.03	17
2014-02-17	10.67	2.84	17
2014-02-18	10.13	3.83	17
2014-02-19	10.13	2.65	17
2014-02-20	12.50	3.95	17
2014-02-21	10.15	0.19	17
2014-02-22	11.63	1.59	17
2014-02-23	11.94	5.53	17
2014-02-24	14.23	5.52	17
2014-02-25	11.43	3.89	17
2014-02-26	11.29	1.67	17
2014-02-27	10.31	1.41	17

date	weekday	cloudCover	humidity	visibility	month	dewPoint	\
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2011-12-03	6	0.54	0.79	12.70	12	6.58
2011-12-04	7	0.36	0.82	13.36	12	4.87
2011-12-05	1	0.20	0.77	13.00	12	0.84
2011-12-06	2	0.34	0.83	13.15	12	2.15
2011-12-07	3	0.29	0.68	13.12	12	1.79
2011-12-08	4	0.53	0.81	12.59	12	5.96
2011-12-09	5	0.15	0.71	12.83	12	0.41
2011-12-10	6	0.17	0.81	12.83	12	-0.34
2011-12-11	7	0.56	0.88	12.09	12	4.49
2011-12-12	1	0.38	0.84	12.05	12	4.10
2011-12-13	2	0.42	0.75	12.55	12	3.62
2011-12-14	3	0.36	0.79	13.20	12	1.68
2011-12-15	4	0.42	0.77	12.79	12	2.41
2011-12-16	5	0.70	0.88	10.96	12	1.60
2011-12-17	6	0.37	0.86	11.64	12	0.96
2011-12-18	7	0.22	0.84	13.04	12	-0.31
2011-12-19	1	0.47	0.94	10.43	12	2.45
2011-12-20	2	0.48	0.81	12.89	12	3.64
2011-12-21	3	0.67	0.94	9.41	12	8.60
2011-12-22	4	0.38	0.87	12.99	12	8.07
2011-12-23	5	0.74	0.85	12.36	12	7.08
2011-12-24	6	0.37	0.80	13.16	12	2.79
2011-12-25	7	0.88	0.83	13.99	12	7.90
2011-12-26	1	0.81	0.84	13.23	12	8.88
2011-12-27	2	0.85	0.74	13.39	12	5.47
2011-12-28	3	0.46	0.77	12.83	12	4.89
2011-12-29	4	0.45	0.76	13.13	12	3.30
2011-12-30	5	0.56	0.84	11.06	12	4.12
2011-12-31	6	0.76	0.89	13.33	12	9.87
2012-01-01	7	0.58	0.90	12.33	1	9.45
...	...	...	...	...	...	...
2014-01-29	3	0.93	0.90	9.53	1	3.05
2014-01-30	4	0.81	0.91	6.63	1	3.08
2014-01-31	5	0.73	0.91	7.08	1	3.93
2014-02-01	6	0.19	0.76	11.60	2	3.18
2014-02-02	7	0.22	0.72	12.89	2	2.63
2014-02-03	1	0.47	0.79	12.50	2	2.86
2014-02-04	2	0.42	0.75	12.05	2	2.69
2014-02-05	3	0.73	0.77	10.91	2	4.06
2014-02-06	4	0.67	0.82	10.53	2	4.96
2014-02-07	5	0.63	0.79	10.85	2	4.16
2014-02-08	6	0.47	0.77	11.20	2	3.99
2014-02-09	7	0.52	0.66	12.71	2	0.82
2014-02-10	1	0.55	0.84	11.81	2	3.01
2014-02-11	2	0.41	0.76	12.39	2	1.32
2014-02-12	3	0.59	0.75	11.80	2	1.94
2014-02-13	4	0.36	0.68	13.04	2	-0.01
2014-02-14	5	0.67	0.81	11.17	2	3.99



2014-02-15	6	0.35	0.69	12.38	2	2.95
2014-02-16	7	0.13	0.76	12.78	2	1.76
2014-02-17	1	0.56	0.83	10.32	2	5.02
2014-02-18	2	0.57	0.87	11.49	2	6.23
2014-02-19	3	0.64	0.87	9.95	2	5.62
2014-02-20	4	0.61	0.84	10.61	2	7.23
2014-02-21	5	0.22	0.72	13.31	2	1.83
2014-02-22	6	0.25	0.71	13.07	2	2.64
2014-02-23	7	0.66	0.76	12.33	2	6.17
2014-02-24	1	0.50	0.74	13.00	2	6.03
2014-02-25	2	0.62	0.78	12.09	2	5.06
2014-02-26	3	0.26	0.73	13.00	2	2.74
2014-02-27	4	0.32	0.74	12.04	2	3.08

	pressure	energy_sum
date		
2011-12-03	1003.55	9.007000
2011-12-04	1001.15	20.763000
2011-12-05	1006.01	6.020000
2011-12-06	1007.32	13.322000
2011-12-07	1008.76	6.782000
2011-12-08	1010.84	14.894000
2011-12-09	1010.60	10.796667
2011-12-10	1015.58	18.162333
2011-12-11	1007.71	20.150000
2011-12-12	1002.47	13.220000
2011-12-13	990.27	15.194000
2011-12-14	994.48	16.132333
2011-12-15	996.75	19.022000
2011-12-16	988.10	15.795667
2011-12-17	1008.46	22.360167
2011-12-18	1016.37	26.862833
2011-12-19	1014.39	17.902167
2011-12-20	1015.09	19.325000
2011-12-21	1017.91	15.038250
2011-12-22	1024.71	18.259889
2011-12-23	1017.67	18.557222
2011-12-24	1028.17	21.678778
2011-12-25	1028.45	23.675444
2011-12-26	1033.14	23.246778
2011-12-27	1032.76	17.692333
2011-12-28	1021.31	20.734667
2011-12-29	1020.47	22.451333
2011-12-30	1016.85	20.575333
2011-12-31	1010.02	20.179000
2012-01-01	1004.82	21.594111
...	...	...
2014-01-29	993.99	22.076482

2014-01-30	1001.76	22.490156
2014-01-31	998.51	21.578979
2014-02-01	990.08	21.769440
2014-02-02	1005.39	22.128730
2014-02-03	1003.89	20.850475
2014-02-04	996.87	20.586582
2014-02-05	982.20	20.563536
2014-02-06	989.90	20.609100
2014-02-07	988.77	20.211364
2014-02-08	979.25	21.177479
2014-02-09	984.71	22.644650
2014-02-10	992.84	21.083121
2014-02-11	996.66	21.357100
2014-02-12	994.27	22.084629
2014-02-13	992.43	20.748493
2014-02-14	990.31	21.780493
2014-02-15	988.63	20.084590
2014-02-16	1006.70	20.684784
2014-02-17	1007.80	20.437626
2014-02-18	1008.67	19.891237
2014-02-19	1011.57	19.364158
2014-02-20	1001.54	19.563906
2014-02-21	1003.42	19.203645
2014-02-22	1009.09	19.461319
2014-02-23	1010.37	19.900825
2014-02-24	1005.19	18.241676
2014-02-25	1000.65	18.690212
2014-02-26	1012.73	18.226752
2014-02-27	1007.02	18.503562

[818 rows x 11 columns]

```
In [12]: #Ens quedem amb date i energy_sum, ordenem valors per data i resetejem index
daily_dia=daily_dia[['energy_sum','apparentTemperatureMax','apparentTemperatureMin'],'date']
daily_dia.head(5)
daily_dia=daily_dia[['date','energy_sum','apparentTemperatureMax','apparentTemperatureMin']]
```

```
In [13]: daily_dia.head(5)
```

```
Out[13]:
```

	date	energy_sum	apparentTemperatureMax	apparentTemperatureMin	\
0	2011-12-03	9.007	11.42	4.71	
1	2011-12-04	20.763	6.66	1.03	
2	2011-12-05	6.020	3.13	-1.69	
3	2011-12-06	13.322	3.77	-1.61	
4	2011-12-07	6.782	5.14	0.94	

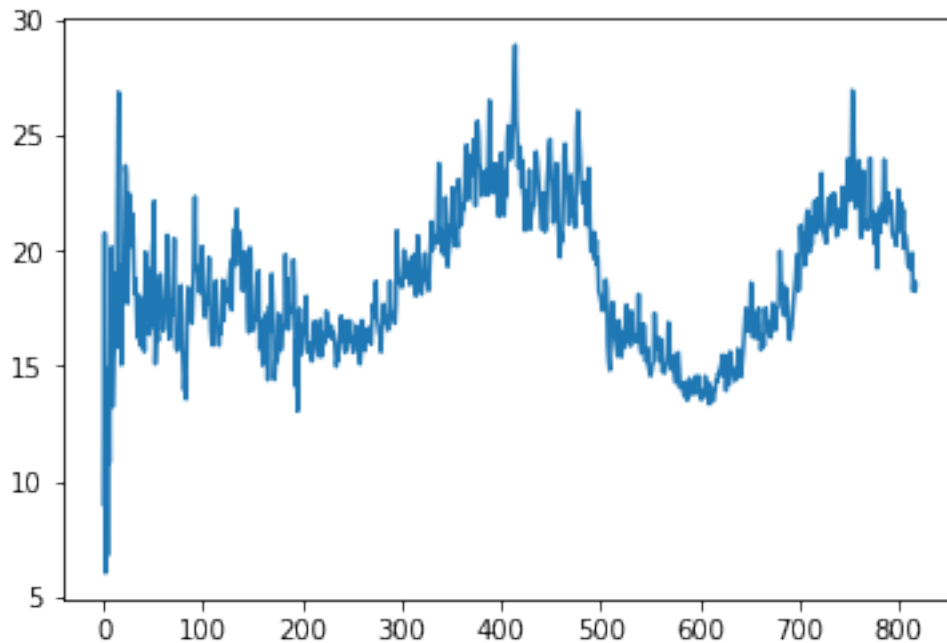
  

	humidity	weekday
0	0.79	6

1	0.82	7
2	0.77	1
3	0.83	2
4	0.68	3

```
In [14]: plt.plot(daily_dia.energy_sum )
```

```
Out[14]: [<matplotlib.lines.Line2D at 0x1daf3226da0>]
```



```
In [15]: daily_dia['t-1']=daily_dia['energy_sum'].shift(1)
daily_dia['t-2']=daily_dia['energy_sum'].shift(2)
daily_dia['t-3']=daily_dia['energy_sum'].shift(3)
daily_dia['t-4']=daily_dia['energy_sum'].shift(4)
daily_dia['t-5']=daily_dia['energy_sum'].shift(5)
daily_dia['t-6']=daily_dia['energy_sum'].shift(6)
daily_dia['t-7']=daily_dia['energy_sum'].shift(7)
daily_dia['t-8']=daily_dia['energy_sum'].shift(8)
daily_dia['t-9']=daily_dia['energy_sum'].shift(9)
daily_dia['t-10']=daily_dia['energy_sum'].shift(10)
daily_dia['t-11']=daily_dia['energy_sum'].shift(11)
daily_dia['t-12']=daily_dia['energy_sum'].shift(12)
daily_dia['t-13']=daily_dia['energy_sum'].shift(13)
daily_dia['t-14']=daily_dia['energy_sum'].shift(14)

daily_dia['temp(t-1)']=daily_dia['apparentTemperatureMax'].shift(1)
daily_dia['temp(t-2)']=daily_dia['apparentTemperatureMax'].shift(2)
```

```

daily_dia['temp(t-3)']=daily_dia['apparentTemperatureMax'].shift(3)
daily_dia['temp(t-4)']=daily_dia['apparentTemperatureMax'].shift(4)
daily_dia['temp(t-5)']=daily_dia['apparentTemperatureMax'].shift(5)
daily_dia['temp(t-6)']=daily_dia['apparentTemperatureMax'].shift(6)
daily_dia['temp(t-7)']=daily_dia['apparentTemperatureMax'].shift(7)
daily_dia['temp(t-8)']=daily_dia['apparentTemperatureMax'].shift(8)
daily_dia['temp(t-9)']=daily_dia['apparentTemperatureMax'].shift(9)
daily_dia['temp(t-10)']=daily_dia['apparentTemperatureMax'].shift(10)
daily_dia['temp(t-11)']=daily_dia['apparentTemperatureMax'].shift(11)
daily_dia['temp(t-12)']=daily_dia['apparentTemperatureMax'].shift(12)
daily_dia['temp(t-13)']=daily_dia['apparentTemperatureMax'].shift(13)
daily_dia['temp(t-14)']=daily_dia['apparentTemperatureMax'].shift(14)

```

```

daily_dia['tempmin(t-1)']=daily_dia['apparentTemperatureMin'].shift(1)
daily_dia['tempmin(t-2)']=daily_dia['apparentTemperatureMin'].shift(2)
daily_dia['tempmin(t-3)']=daily_dia['apparentTemperatureMin'].shift(3)
daily_dia['tempmin(t-4)']=daily_dia['apparentTemperatureMin'].shift(4)
daily_dia['tempmin(t-5)']=daily_dia['apparentTemperatureMin'].shift(5)
daily_dia['tempmin(t-6)']=daily_dia['apparentTemperatureMin'].shift(6)
daily_dia['tempmin(t-7)']=daily_dia['apparentTemperatureMin'].shift(7)
daily_dia['tempmin(t-8)']=daily_dia['apparentTemperatureMin'].shift(8)
daily_dia['tempmin(t-9)']=daily_dia['apparentTemperatureMin'].shift(9)
daily_dia['tempmin(t-10)']=daily_dia['apparentTemperatureMin'].shift(10)
daily_dia['tempmin(t-11)']=daily_dia['apparentTemperatureMin'].shift(11)
daily_dia['tempmin(t-12)']=daily_dia['apparentTemperatureMin'].shift(12)
daily_dia['tempmin(t-13)']=daily_dia['apparentTemperatureMin'].shift(13)
daily_dia['tempmin(t-14)']=daily_dia['apparentTemperatureMin'].shift(14)

```

```

daily_dia['humidity(t-1)']=daily_dia['humidity'].shift(1)
daily_dia['humidity(t-2)']=daily_dia['humidity'].shift(2)
daily_dia['humidity(t-3)']=daily_dia['humidity'].shift(3)
daily_dia['humidity(t-4)']=daily_dia['humidity'].shift(4)
daily_dia['humidity(t-5)']=daily_dia['humidity'].shift(5)
daily_dia['humidity(t-6)']=daily_dia['humidity'].shift(6)
daily_dia['humidity(t-7)']=daily_dia['humidity'].shift(7)
daily_dia['humidity(t-8)']=daily_dia['humidity'].shift(8)
daily_dia['humidity(t-9)']=daily_dia['humidity'].shift(9)
daily_dia['humidity(t-10)']=daily_dia['humidity'].shift(10)
daily_dia['humidity(t-11)']=daily_dia['humidity'].shift(11)
daily_dia['humidity(t-12)']=daily_dia['humidity'].shift(12)
daily_dia['humidity(t-13)']=daily_dia['humidity'].shift(13)
daily_dia['humidity(t-14)']=daily_dia['humidity'].shift(14)

```

```

daily_dia['weekday(t-1)']=daily_dia['weekday'].shift(1)
daily_dia['weekday(t-2)']=daily_dia['weekday'].shift(2)
daily_dia['weekday(t-3)']=daily_dia['weekday'].shift(3)
daily_dia['weekday(t-4)']=daily_dia['weekday'].shift(4)
daily_dia['weekday(t-5)']=daily_dia['weekday'].shift(5)

```

```

daily_dia['weekday(t-6)']=daily_dia['weekday'].shift(6)
daily_dia['weekday(t-7)']=daily_dia['weekday'].shift(7)
daily_dia['weekday(t-8)']=daily_dia['weekday'].shift(8)
daily_dia['weekday(t-9)']=daily_dia['weekday'].shift(9)
daily_dia['weekday(t-10)']=daily_dia['weekday'].shift(10)
daily_dia['weekday(t-11)']=daily_dia['weekday'].shift(11)
daily_dia['weekday(t-12)']=daily_dia['weekday'].shift(12)
daily_dia['weekday(t-13)']=daily_dia['weekday'].shift(13)
daily_dia['weekday(t-14)']=daily_dia['weekday'].shift(14)

```

daily\_dia

```

Out[15]:

```

	date	energy_sum	apparentTemperatureMax	apparentTemperatureMin	\
0	2011-12-03	9.007000	11.42	4.71	
1	2011-12-04	20.763000	6.66	1.03	
2	2011-12-05	6.020000	3.13	-1.69	
3	2011-12-06	13.322000	3.77	-1.61	
4	2011-12-07	6.782000	5.14	0.94	
5	2011-12-08	14.894000	12.89	0.63	
6	2011-12-09	10.796667	3.99	-1.42	
7	2011-12-10	18.162333	3.14	-3.42	
8	2011-12-11	20.150000	5.72	0.11	
9	2011-12-12	13.220000	5.94	-0.64	
10	2011-12-13	15.194000	12.08	0.22	
11	2011-12-14	16.132333	2.88	0.78	
12	2011-12-15	19.022000	4.38	1.07	
13	2011-12-16	15.795667	0.99	-2.65	
14	2011-12-17	22.360167	1.72	-3.56	
15	2011-12-18	26.862833	1.98	-4.12	
16	2011-12-19	17.902167	4.02	-3.67	
17	2011-12-20	19.325000	4.98	1.68	
18	2011-12-21	15.038250	12.14	3.84	
19	2011-12-22	18.259889	12.14	5.37	
20	2011-12-23	18.557222	11.44	0.99	
21	2011-12-24	21.678778	5.32	-0.51	
22	2011-12-25	23.675444	11.98	5.93	
23	2011-12-26	23.246778	12.91	6.91	
24	2011-12-27	17.692333	10.33	5.59	
25	2011-12-28	20.734667	11.19	1.84	
26	2011-12-29	22.451333	6.46	0.98	
27	2011-12-30	20.575333	10.27	1.71	
28	2011-12-31	20.179000	12.57	10.66	
29	2012-01-01	21.594111	12.59	4.86	
..	...	...	...	...	
788	2014-01-29	22.076482	2.53	0.18	
789	2014-01-30	22.490156	5.86	0.61	
790	2014-01-31	21.578979	5.27	0.29	

791	2014-02-01	21.769440	6.86	1.10
792	2014-02-02	22.128730	6.48	3.21
793	2014-02-03	20.850475	4.59	1.96
794	2014-02-04	20.586582	5.63	1.12
795	2014-02-05	20.563536	5.86	1.03
796	2014-02-06	20.609100	7.34	1.96
797	2014-02-07	20.211364	8.44	-0.86
798	2014-02-08	21.177479	5.67	2.19
799	2014-02-09	22.644650	3.91	1.38
800	2014-02-10	21.083121	7.07	0.89
801	2014-02-11	21.357100	4.06	-0.57
802	2014-02-12	22.084629	4.73	-1.20
803	2014-02-13	20.748493	3.42	0.05
804	2014-02-14	21.780493	12.02	0.45
805	2014-02-15	20.084590	5.79	1.77
806	2014-02-16	20.684784	7.88	-1.03
807	2014-02-17	20.437626	10.67	2.84
808	2014-02-18	19.891237	10.13	3.83
809	2014-02-19	19.364158	10.13	2.65
810	2014-02-20	19.563906	12.50	3.95
811	2014-02-21	19.203645	10.15	0.19
812	2014-02-22	19.461319	11.63	1.59
813	2014-02-23	19.900825	11.94	5.53
814	2014-02-24	18.241676	14.23	5.52
815	2014-02-25	18.690212	11.43	3.89
816	2014-02-26	18.226752	11.29	1.67
817	2014-02-27	18.503562	10.31	1.41

	humidity	weekday	t-1	t-2	t-3	t-4	...	\
0	0.79	6	NaN	NaN	NaN	NaN	...	
1	0.82	7	9.007000	NaN	NaN	NaN	...	
2	0.77	1	20.763000	9.007000	NaN	NaN	...	
3	0.83	2	6.020000	20.763000	9.007000	NaN	...	
4	0.68	3	13.322000	6.020000	20.763000	9.007000	...	
5	0.81	4	6.782000	13.322000	6.020000	20.763000	...	
6	0.71	5	14.894000	6.782000	13.322000	6.020000	...	
7	0.81	6	10.796667	14.894000	6.782000	13.322000	...	
8	0.88	7	18.162333	10.796667	14.894000	6.782000	...	
9	0.84	1	20.150000	18.162333	10.796667	14.894000	...	
10	0.75	2	13.220000	20.150000	18.162333	10.796667	...	
11	0.79	3	15.194000	13.220000	20.150000	18.162333	...	
12	0.77	4	16.132333	15.194000	13.220000	20.150000	...	
13	0.88	5	19.022000	16.132333	15.194000	13.220000	...	
14	0.86	6	15.795667	19.022000	16.132333	15.194000	...	
15	0.84	7	22.360167	15.795667	19.022000	16.132333	...	
16	0.94	1	26.862833	22.360167	15.795667	19.022000	...	
17	0.81	2	17.902167	26.862833	22.360167	15.795667	...	
18	0.94	3	19.325000	17.902167	26.862833	22.360167	...	

19	0.87	4	15.038250	19.325000	17.902167	26.862833	...
20	0.85	5	18.259889	15.038250	19.325000	17.902167	...
21	0.80	6	18.557222	18.259889	15.038250	19.325000	...
22	0.83	7	21.678778	18.557222	18.259889	15.038250	...
23	0.84	1	23.675444	21.678778	18.557222	18.259889	...
24	0.74	2	23.246778	23.675444	21.678778	18.557222	...
25	0.77	3	17.692333	23.246778	23.675444	21.678778	...
26	0.76	4	20.734667	17.692333	23.246778	23.675444	...
27	0.84	5	22.451333	20.734667	17.692333	23.246778	...
28	0.89	6	20.575333	22.451333	20.734667	17.692333	...
29	0.90	7	20.179000	20.575333	22.451333	20.734667	...
..	...	...	...	...	...	...	...
788	0.90	3	21.197113	22.459621	23.947411	22.056206	...
789	0.91	4	22.076482	21.197113	22.459621	23.947411	...
790	0.91	5	22.490156	22.076482	21.197113	22.459621	...
791	0.76	6	21.578979	22.490156	22.076482	21.197113	...
792	0.72	7	21.769440	21.578979	22.490156	22.076482	...
793	0.79	1	22.128730	21.769440	21.578979	22.490156	...
794	0.75	2	20.850475	22.128730	21.769440	21.578979	...
795	0.77	3	20.586582	20.850475	22.128730	21.769440	...
796	0.82	4	20.563536	20.586582	20.850475	22.128730	...
797	0.79	5	20.609100	20.563536	20.586582	20.850475	...
798	0.77	6	20.211364	20.609100	20.563536	20.586582	...
799	0.66	7	21.177479	20.211364	20.609100	20.563536	...
800	0.84	1	22.644650	21.177479	20.211364	20.609100	...
801	0.76	2	21.083121	22.644650	21.177479	20.211364	...
802	0.75	3	21.357100	21.083121	22.644650	21.177479	...
803	0.68	4	22.084629	21.357100	21.083121	22.644650	...
804	0.81	5	20.748493	22.084629	21.357100	21.083121	...
805	0.69	6	21.780493	20.748493	22.084629	21.357100	...
806	0.76	7	20.084590	21.780493	20.748493	22.084629	...
807	0.83	1	20.684784	20.084590	21.780493	20.748493	...
808	0.87	2	20.437626	20.684784	20.084590	21.780493	...
809	0.87	3	19.891237	20.437626	20.684784	20.084590	...
810	0.84	4	19.364158	19.891237	20.437626	20.684784	...
811	0.72	5	19.563906	19.364158	19.891237	20.437626	...
812	0.71	6	19.203645	19.563906	19.364158	19.891237	...
813	0.76	7	19.461319	19.203645	19.563906	19.364158	...
814	0.74	1	19.900825	19.461319	19.203645	19.563906	...
815	0.78	2	18.241676	19.900825	19.461319	19.203645	...
816	0.73	3	18.690212	18.241676	19.900825	19.461319	...
817	0.74	4	18.226752	18.690212	18.241676	19.900825	...

	weekday(t-5)	weekday(t-6)	weekday(t-7)	weekday(t-8)	weekday(t-9)	\
0	NaN	NaN	NaN	NaN	NaN	
1	NaN	NaN	NaN	NaN	NaN	
2	NaN	NaN	NaN	NaN	NaN	
3	NaN	NaN	NaN	NaN	NaN	

4	NaN	NaN	NaN	NaN	NaN
5	6.0	NaN	NaN	NaN	NaN
6	7.0	6.0	NaN	NaN	NaN
7	1.0	7.0	6.0	NaN	NaN
8	2.0	1.0	7.0	6.0	NaN
9	3.0	2.0	1.0	7.0	6.0
10	4.0	3.0	2.0	1.0	7.0
11	5.0	4.0	3.0	2.0	1.0
12	6.0	5.0	4.0	3.0	2.0
13	7.0	6.0	5.0	4.0	3.0
14	1.0	7.0	6.0	5.0	4.0
15	2.0	1.0	7.0	6.0	5.0
16	3.0	2.0	1.0	7.0	6.0
17	4.0	3.0	2.0	1.0	7.0
18	5.0	4.0	3.0	2.0	1.0
19	6.0	5.0	4.0	3.0	2.0
20	7.0	6.0	5.0	4.0	3.0
21	1.0	7.0	6.0	5.0	4.0
22	2.0	1.0	7.0	6.0	5.0
23	3.0	2.0	1.0	7.0	6.0
24	4.0	3.0	2.0	1.0	7.0
25	5.0	4.0	3.0	2.0	1.0
26	6.0	5.0	4.0	3.0	2.0
27	7.0	6.0	5.0	4.0	3.0
28	1.0	7.0	6.0	5.0	4.0
29	2.0	1.0	7.0	6.0	5.0
..	...	...	...	...	...
788	5.0	4.0	3.0	2.0	1.0
789	6.0	5.0	4.0	3.0	2.0
790	7.0	6.0	5.0	4.0	3.0
791	1.0	7.0	6.0	5.0	4.0
792	2.0	1.0	7.0	6.0	5.0
793	3.0	2.0	1.0	7.0	6.0
794	4.0	3.0	2.0	1.0	7.0
795	5.0	4.0	3.0	2.0	1.0
796	6.0	5.0	4.0	3.0	2.0
797	7.0	6.0	5.0	4.0	3.0
798	1.0	7.0	6.0	5.0	4.0
799	2.0	1.0	7.0	6.0	5.0
800	3.0	2.0	1.0	7.0	6.0
801	4.0	3.0	2.0	1.0	7.0
802	5.0	4.0	3.0	2.0	1.0
803	6.0	5.0	4.0	3.0	2.0
804	7.0	6.0	5.0	4.0	3.0
805	1.0	7.0	6.0	5.0	4.0
806	2.0	1.0	7.0	6.0	5.0
807	3.0	2.0	1.0	7.0	6.0
808	4.0	3.0	2.0	1.0	7.0



809	5.0	4.0	3.0	2.0	1.0
810	6.0	5.0	4.0	3.0	2.0
811	7.0	6.0	5.0	4.0	3.0
812	1.0	7.0	6.0	5.0	4.0
813	2.0	1.0	7.0	6.0	5.0
814	3.0	2.0	1.0	7.0	6.0
815	4.0	3.0	2.0	1.0	7.0
816	5.0	4.0	3.0	2.0	1.0
817	6.0	5.0	4.0	3.0	2.0

	weekday(t-10)	weekday(t-11)	weekday(t-12)	weekday(t-13)	weekday(t-14)
0	NaN	NaN	NaN	NaN	NaN
1	NaN	NaN	NaN	NaN	NaN
2	NaN	NaN	NaN	NaN	NaN
3	NaN	NaN	NaN	NaN	NaN
4	NaN	NaN	NaN	NaN	NaN
5	NaN	NaN	NaN	NaN	NaN
6	NaN	NaN	NaN	NaN	NaN
7	NaN	NaN	NaN	NaN	NaN
8	NaN	NaN	NaN	NaN	NaN
9	NaN	NaN	NaN	NaN	NaN
10	6.0	NaN	NaN	NaN	NaN
11	7.0	6.0	NaN	NaN	NaN
12	1.0	7.0	6.0	NaN	NaN
13	2.0	1.0	7.0	6.0	NaN
14	3.0	2.0	1.0	7.0	6.0
15	4.0	3.0	2.0	1.0	7.0
16	5.0	4.0	3.0	2.0	1.0
17	6.0	5.0	4.0	3.0	2.0
18	7.0	6.0	5.0	4.0	3.0
19	1.0	7.0	6.0	5.0	4.0
20	2.0	1.0	7.0	6.0	5.0
21	3.0	2.0	1.0	7.0	6.0
22	4.0	3.0	2.0	1.0	7.0
23	5.0	4.0	3.0	2.0	1.0
24	6.0	5.0	4.0	3.0	2.0
25	7.0	6.0	5.0	4.0	3.0
26	1.0	7.0	6.0	5.0	4.0
27	2.0	1.0	7.0	6.0	5.0
28	3.0	2.0	1.0	7.0	6.0
29	4.0	3.0	2.0	1.0	7.0
..	...	...	...	...	...
788	7.0	6.0	5.0	4.0	3.0
789	1.0	7.0	6.0	5.0	4.0
790	2.0	1.0	7.0	6.0	5.0
791	3.0	2.0	1.0	7.0	6.0
792	4.0	3.0	2.0	1.0	7.0
793	5.0	4.0	3.0	2.0	1.0

794	6.0	5.0	4.0	3.0	2.0
795	7.0	6.0	5.0	4.0	3.0
796	1.0	7.0	6.0	5.0	4.0
797	2.0	1.0	7.0	6.0	5.0
798	3.0	2.0	1.0	7.0	6.0
799	4.0	3.0	2.0	1.0	7.0
800	5.0	4.0	3.0	2.0	1.0
801	6.0	5.0	4.0	3.0	2.0
802	7.0	6.0	5.0	4.0	3.0
803	1.0	7.0	6.0	5.0	4.0
804	2.0	1.0	7.0	6.0	5.0
805	3.0	2.0	1.0	7.0	6.0
806	4.0	3.0	2.0	1.0	7.0
807	5.0	4.0	3.0	2.0	1.0
808	6.0	5.0	4.0	3.0	2.0
809	7.0	6.0	5.0	4.0	3.0
810	1.0	7.0	6.0	5.0	4.0
811	2.0	1.0	7.0	6.0	5.0
812	3.0	2.0	1.0	7.0	6.0
813	4.0	3.0	2.0	1.0	7.0
814	5.0	4.0	3.0	2.0	1.0
815	6.0	5.0	4.0	3.0	2.0
816	7.0	6.0	5.0	4.0	3.0
817	1.0	7.0	6.0	5.0	4.0

[818 rows x 76 columns]

```
In [17]: #Ens quedem amb energies i temperatures
#No agafem apparent temperature max ja que quan fem la predicció representa que no ho
daily_dia=daily_dia.drop(['date','apparentTemperatureMax','apparentTemperatureMin','I
daily_dia.head(5)
```

```
Out[17]:
```

	energy_sum	t-1	t-2	t-3	t-4	t-5	t-6	t-7	t-8	t-9	...	\
0	9.007	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	...	
1	20.763	9.007	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	...	
2	6.020	20.763	9.007	NaN	NaN	NaN	NaN	NaN	NaN	NaN	...	
3	13.322	6.020	20.763	9.007	NaN	NaN	NaN	NaN	NaN	NaN	...	
4	6.782	13.322	6.020	20.763	9.007	NaN	NaN	NaN	NaN	NaN	...	

	weekday(t-5)	weekday(t-6)	weekday(t-7)	weekday(t-8)	weekday(t-9)	\
0	NaN	NaN	NaN	NaN	NaN	
1	NaN	NaN	NaN	NaN	NaN	
2	NaN	NaN	NaN	NaN	NaN	
3	NaN	NaN	NaN	NaN	NaN	
4	NaN	NaN	NaN	NaN	NaN	

	weekday(t-10)	weekday(t-11)	weekday(t-12)	weekday(t-13)	weekday(t-14)
0	NaN	NaN	NaN	NaN	NaN

1	NaN	NaN	NaN	NaN	NaN
2	NaN	NaN	NaN	NaN	NaN
3	NaN	NaN	NaN	NaN	NaN
4	NaN	NaN	NaN	NaN	NaN

[5 rows x 71 columns]

In [18]: *#Eliminem les 14 primeres files ja que contenen NaN (valors buits)*

```
daily_dia=daily_dia.drop([0,1,2,3,4,5,6,7,8,9,10,11,12,13])
daily_dia.head(5)
```

```
Out[18]:
```

	energy_sum	t-1	t-2	t-3	t-4	t-5	\
14	22.360167	15.795667	19.022000	16.132333	15.194000	13.220000	
15	26.862833	22.360167	15.795667	19.022000	16.132333	15.194000	
16	17.902167	26.862833	22.360167	15.795667	19.022000	16.132333	
17	19.325000	17.902167	26.862833	22.360167	15.795667	19.022000	
18	15.038250	19.325000	17.902167	26.862833	22.360167	15.795667	

	t-6	t-7	t-8	t-9	...	weekday(t-5)	\
14	20.150000	18.162333	10.796667	14.894000	...	1.0	
15	13.220000	20.150000	18.162333	10.796667	...	2.0	
16	15.194000	13.220000	20.150000	18.162333	...	3.0	
17	16.132333	15.194000	13.220000	20.150000	...	4.0	
18	19.022000	16.132333	15.194000	13.220000	...	5.0	

	weekday(t-6)	weekday(t-7)	weekday(t-8)	weekday(t-9)	weekday(t-10)	\
14	7.0	6.0	5.0	4.0	3.0	
15	1.0	7.0	6.0	5.0	4.0	
16	2.0	1.0	7.0	6.0	5.0	
17	3.0	2.0	1.0	7.0	6.0	
18	4.0	3.0	2.0	1.0	7.0	

	weekday(t-11)	weekday(t-12)	weekday(t-13)	weekday(t-14)
14	2.0	1.0	7.0	6.0
15	3.0	2.0	1.0	7.0
16	4.0	3.0	2.0	1.0
17	5.0	4.0	3.0	2.0
18	6.0	5.0	4.0	3.0

[5 rows x 71 columns]

In [19]: `len(daily_dia)`

Out[19]: 804

In [20]: *#normalitzem*

```
scaler=preprocessing.MinMaxScaler(feature_range=(0, 1))
daily_dia_norm=scaler.fit_transform(daily_dia)
```

```
In [21]: #Seleccionem dades per test i train
y_daily=daily_dia_norm[:,0]
X_daily=daily_dia_norm[:,1:72]

#y_daily=daily_dia['energy_sum']
#X_daily=daily_dia.drop(['energy_sum'], axis='columns')

#Reshape de [samples,timesteps] a [samples,timesteps,features]

#Enlloc de 14 features en son 7 de una feature i 7 duna altre
X_daily=np.reshape(X_daily, (X_daily.shape[0], 14,5))
```

```
In [22]: # definim model
import tensorflow as tf
model =Sequential()
model.add(LSTM(50, activation='relu', input_shape=(14, 5)))
model.add(Dense(1))
model.compile(optimizer='adam', loss='mse')
```

WARNING:tensorflow:From c:\users\laura\appdata\local\programs\python\python37\lib\site-packages: Instructions for updating:  
Colocations handled automatically by placer.

```
In [23]: import math
from sklearn.metrics import mean_squared_error

#Walk forward per test i train
minim=100
n_train=465
lenght=len(daily_dia)

llista_evaluate=list()
llista_prediccions=list()
llista_preditrain=list()
llista_scores=list()
llista_scoretrain=list()
sumScores=0

for i in range(n_train,lenght):
    #minim=minim+1
    X_train,X_test= X_daily[minim:i],X_daily[i:i+1]
    y_train,y_test= y_daily[minim:i],y_daily[i:i+1]

    #fem fit al model
    model.fit(X_train, y_train, epochs=50, verbose=0)
```

```

#mostrem score per cada model
score=model.evaluate(X_test,y_test,verbose=0)
llista_evaluate.append(score)

#Predim per cadascun
preditest=model.predict(X_test)
llista_prediccions.append(preditest)

preditrain=model.predict(X_train)
llista_preditrain.append(preditrain)

trainScore = math.sqrt(mean_squared_error(y_train, predictrain))
llista_scoretrain.append(trainScore )

testScore = math.sqrt(mean_squared_error(y_test, predictest))
llista_scores.append(testScore)

sumScores=sumScores+testScore

```

WARNING:tensorflow:From c:\users\laura\AppData\Local\programs\python\python37\lib\site-packages\tensorflow\python\ops\math\_ops.py:3100: div (no longer supported): Instructions for updating:  
Use tf.cast instead.

In [24]: *#Dividim la suma de scores de test entre el nombre de prediccions per obtenir la mitjana*  
sumScores/(length-n\_train)

Out [24]: 0.04886626949969405

In [25]: llista\_scores

Out [25]: [0.03256936801533172,  
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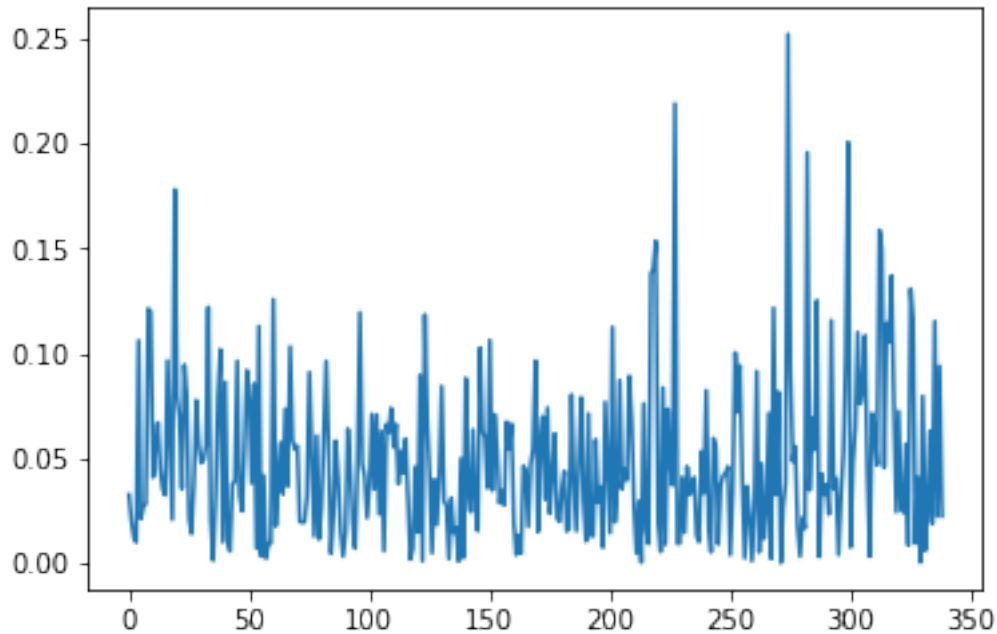
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0.022351034383017887,  
0.09389247689279301,  
0.022393465121265277]
```

```
In [26]: plt.plot(llista_scores)
```

```
Out[26]: [<matplotlib.lines.Line2D at 0x1daf64297b8>]
```



```
In [28]: predis=list()
```

```
for i in range(len(llista_prediccions)):
    predi=llista_prediccions[i].tolist()
    predis.append(predi)
```

```
predis=np.reshape(predis, (339) )
```

```
predis
```

```
Out[28]: array([ 0.66572404,  0.61070859,  0.58045572,  0.60055488,  0.67204124,
                  0.64823079,  0.56589991,  0.53558004,  0.48354191,  0.54407251,
                  0.56476218,  0.49134576,  0.52910084,  0.39337364,  0.4539592 ,
                  0.4474338 ,  0.37084293,  0.45770684,  0.40023553,  0.50266683,
                  0.4006393 ,  0.37646398,  0.33219922,  0.36877036,  0.36710954,
                  0.30179006,  0.37330642,  0.29530928,  0.26071769,  0.19375075,
                  0.1595349 ,  0.1481252 ,  0.2362199 ,  0.42027029,  0.20934635,
                  0.20112461,  0.21869639,  0.24506807,  0.25165755,  0.23806806,
                  0.30028534,  0.18512455,  0.14208585,  0.24354604,  0.25816962,
                  0.27040562,  0.29793543,  0.31479537,  0.24573651,  0.36316654,
                  0.28610125,  0.21589318,  0.18768474,  0.20733669,  0.30779904,
                  0.20221911,  0.15407811,  0.18727225,  0.24242243,  0.32919058,
                  0.31892776,  0.18675242,  0.19725917,  0.17858894,  0.20615557,
                  0.30641842,  0.10090896,  0.03409747,  0.11397836,  0.17370296,
                  0.16723365,  0.11568164,  0.08750208,  0.1091743 ,  0.16462822,
                  0.17710611,  0.24144274,  0.18519951,  0.14123398,  0.18537579,
```

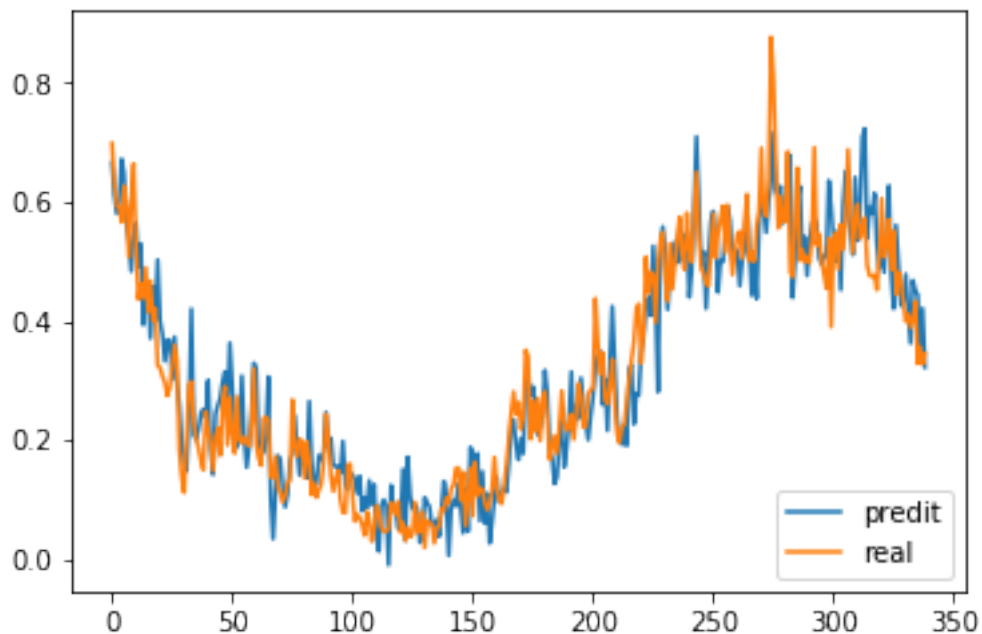
0.16264167,	0.13646194,	0.2649903 ,	0.16249138,	0.12360967,
0.12618612,	0.1741024 ,	0.16619137,	0.17993386,	0.24633667,
0.1877851 ,	0.20343301,	0.15865324,	0.15518023,	0.1561144 ,
0.14523691,	0.19807151,	0.12511957,	0.11718813,	0.1383763 ,
0.14239676,	0.13454919,	0.11023047,	0.13924454,	0.08103047,
0.10274956,	0.08565731,	0.13221058,	0.09206988,	0.12515086,
0.03452799,	0.01305773,	0.09036803,	0.09968303,	0.09009591,
-0.00978342,	0.1241852 ,	0.08607535,	0.08171116,	0.05126354,
0.05926953,	0.15122005,	0.03177481,	0.1714758 ,	0.10535958,
0.08450623,	0.09115516,	0.08403215,	0.02808364,	0.03722315,
0.10354041,	0.09482948,	0.0878851 ,	0.05656676,	0.05760785,
0.06605051,	0.03803497,	0.08413897,	0.13078266,	0.10539864,
0.00594761,	0.08531263,	0.09984719,	0.08867919,	0.12709245,
0.08312167,	0.0439209 ,	0.11921224,	0.04645111,	0.18795839,
0.17850772,	0.12858663,	0.17748156,	0.06421632,	0.14714134,
0.06059039,	0.11065786,	0.02677371,	0.06067554,	0.10445639,
0.13731967,	0.09533642,	0.10676695,	0.11914389,	0.11260795,
0.15956894,	0.2295197 ,	0.2342481 ,	0.18949266,	0.16710778,
0.20306873,	0.17758302,	0.28122038,	0.31021321,	0.27565467,
0.28951925,	0.25582531,	0.2090648 ,	0.22014469,	0.2433244 ,
0.31717044,	0.27866644,	0.18277934,	0.16920951,	0.12665364,
0.13763401,	0.20584407,	0.23289229,	0.15440141,	0.18625399,
0.23203431,	0.31464043,	0.21417838,	0.25792494,	0.23625687,
0.30442542,	0.25778091,	0.22984608,	0.20035221,	0.24002384,
0.27267709,	0.32533008,	0.34369129,	0.34908387,	0.2593801 ,
0.30279845,	0.21597637,	0.3312076 ,	0.42455757,	0.33314025,
0.23732421,	0.19982526,	0.19263154,	0.22617623,	0.19072796,
0.32022363,	0.32633907,	0.22691001,	0.27837873,	0.27498505,
0.3483935 ,	0.37268883,	0.42384884,	0.43879592,	0.40895364,
0.52587605,	0.43430129,	0.2808736 ,	0.52497423,	0.55825448,
0.51559198,	0.41915333,	0.48431891,	0.48555821,	0.53219986,
0.49759507,	0.5615797 ,	0.50215155,	0.53981888,	0.5483079 ,
0.43991563,	0.48208696,	0.5832063 ,	0.70959032,	0.59975922,
0.49556983,	0.51658523,	0.42095244,	0.50132024,	0.56739604,
0.58427131,	0.53960979,	0.44811505,	0.50135893,	0.49896082,
0.5543558 ,	0.59239376,	0.56720996,	0.50101852,	0.51347208,
0.51861876,	0.45892006,	0.50019509,	0.51631439,	0.60118175,
0.5251112 ,	0.44282228,	0.50215423,	0.43740076,	0.55186087,
0.60866749,	0.59121662,	0.54868877,	0.6027773 ,	0.62466216,
0.71677959,	0.61875206,	0.61119407,	0.62608588,	0.56415921,
0.58901811,	0.66804129,	0.67777419,	0.43914893,	0.50309777,
0.60305417,	0.62647098,	0.51684284,	0.54143906,	0.47607747,
0.53429258,	0.56311595,	0.57581687,	0.56249797,	0.50546181,
0.49584109,	0.51068783,	0.50711751,	0.63582373,	0.59072721,
0.5315448 ,	0.50005364,	0.55146837,	0.45215708,	0.59613025,
0.65111423,	0.57940102,	0.55086732,	0.51132172,	0.64134747,
0.534832 ,	0.58528614,	0.70929599,	0.72292352,	0.53815997,
0.5904277 ,	0.5799951 ,	0.61428809,	0.5290795 ,	0.48894715,

```

0.53334159, 0.48164043, 0.54873013, 0.62717468, 0.4778201 ,
0.42059106, 0.5608449 , 0.49155295, 0.42593277, 0.43258801,
0.4786517 , 0.4175272 , 0.36257684, 0.46811593, 0.4515146 ,
0.44351384, 0.3342146 , 0.42125458, 0.322411 ])
```

```

In [29]: ##Mostrem
plt.plot(predis, label="predit")
plt.plot(y_daily[n_train:lenght], label="real")
plt.legend(loc="lower right")
plt.show()
```



```

In [30]: #Creem un dataset amb format (nombre prediccions,17) per tornar les prediccions i els
#El necessitem d'aquesta mida encara que només volguem passar 2 variables ja que al fe
#per fer la inversa necessitem 17 variables
#Com que només en tenim 2, les ajuntem al dataset inicial i ens quedem amb 15 variabl
#Obtenint un dataset amb 15 variables aleatòries i les 2 variables que ens interessen
```

```

prova=daily_dia.iloc[n_train:lenght]
prova
#len(predis)
#lenght-n_train
prova['predi']=predis
prova['y']=y_daily[n_train:lenght]
prova=prova.drop(['energy_sum','t-1'], axis=1)
prova
```

```
prova=prova[['predi','y','t-2','t-3','t-4','t-5','t-6','t-7','t-8','t-9','t-10','t-11']]
prova
```

```
c:\users\laura\appdata\local\programs\python\python37\lib\site-packages\ipykernel_launcher.py:
```

A value is trying to be set on a copy of a slice from a DataFrame.

Try using .loc[row\_indexer,col\_indexer] = value instead

See the caveats in the documentation: <http://pandas.pydata.org/pandas-docs/stable/indexing.html>

```
if sys.path[0] == '':
```

```
c:\users\laura\appdata\local\programs\python\python37\lib\site-packages\ipykernel_launcher.py:
```

A value is trying to be set on a copy of a slice from a DataFrame.

Try using .loc[row\_indexer,col\_indexer] = value instead

See the caveats in the documentation: <http://pandas.pydata.org/pandas-docs/stable/indexing.html>

```
del sys.path[0]
```

```
Out[30]:
```

	predi	y	t-2	t-3	t-4	t-5	\
479	0.665724	0.698293	26.045695	25.222896	21.958630	20.990240	
480	0.610709	0.630615	24.921571	26.045695	25.222896	21.958630	
481	0.580456	0.592818	24.113429	24.921571	26.045695	25.222896	
482	0.600555	0.590567	23.039379	24.113429	24.921571	26.045695	
483	0.672041	0.566027	22.439529	23.039379	24.113429	24.921571	
484	0.648231	0.627054	22.403817	22.439529	23.039379	24.113429	
485	0.565900	0.593176	22.014359	22.403817	22.439529	23.039379	
486	0.535580	0.507441	22.982863	22.014359	22.403817	22.439529	
487	0.483542	0.604730	22.445216	22.982863	22.014359	22.403817	
488	0.544073	0.664006	21.084595	22.445216	22.982863	22.014359	
489	0.564762	0.523874	22.628582	21.084595	22.445216	22.982863	
490	0.491346	0.436332	23.569281	22.628582	21.084595	22.445216	
491	0.529101	0.462221	21.345399	23.569281	22.628582	21.084595	
492	0.393374	0.438244	19.956105	21.345399	23.569281	22.628582	
493	0.453959	0.489356	20.366954	19.956105	21.345399	23.569281	
494	0.447434	0.414977	19.986454	20.366954	19.956105	21.345399	
495	0.370843	0.467380	20.797592	19.986454	20.366954	19.956105	
496	0.457707	0.400527	19.617197	20.797592	19.986454	20.366954	
497	0.400236	0.420969	20.448829	19.617197	20.797592	19.986454	
498	0.502667	0.324628	19.387875	20.448829	19.617197	20.797592	
499	0.400639	0.321394	19.712296	19.387875	20.448829	19.617197	
500	0.376464	0.307069	18.183355	19.712296	19.387875	20.448829	
501	0.332199	0.296771	18.132039	18.183355	19.712296	19.387875	
502	0.368770	0.274320	17.904697	18.132039	18.183355	19.712296	
503	0.367110	0.287213	17.741276	17.904697	18.132039	18.183355	
504	0.301790	0.322737	17.384980	17.741276	17.904697	18.132039	
505	0.373306	0.359382	17.589592	17.384980	17.741276	17.904697	
506	0.295309	0.334221	18.153349	17.589592	17.384980	17.741276	
507	0.260718	0.183091	18.734901	18.153349	17.589592	17.384980	



508	0.193751	0.136963	18.335605	18.734901	18.153349	17.589592
...	...	...	...	...	...	...
788	0.641347	0.569941	22.459621	23.947411	22.056206	21.288113
789	0.534832	0.596008	21.197113	22.459621	23.947411	22.056206
790	0.585286	0.538593	22.076482	21.197113	22.459621	23.947411
791	0.709296	0.550594	22.490156	22.076482	21.197113	22.459621
792	0.722924	0.573234	21.578979	22.490156	22.076482	21.197113
793	0.538160	0.492688	21.769440	21.578979	22.490156	22.076482
794	0.590428	0.476060	22.128730	21.769440	21.578979	22.490156
795	0.579995	0.474608	20.850475	22.128730	21.769440	21.578979
796	0.614288	0.477479	20.586582	20.850475	22.128730	21.769440
797	0.529079	0.452417	20.563536	20.586582	20.850475	22.128730
798	0.488947	0.513293	20.609100	20.563536	20.586582	20.850475
799	0.533342	0.605743	20.211364	20.609100	20.563536	20.586582
800	0.481640	0.507348	21.177479	20.211364	20.609100	20.563536
801	0.548730	0.524612	22.644650	21.177479	20.211364	20.609100
802	0.627175	0.570455	21.083121	22.644650	21.177479	20.211364
803	0.477820	0.486262	21.357100	21.083121	22.644650	21.177479
804	0.420591	0.551290	22.084629	21.357100	21.083121	22.644650
805	0.560845	0.444428	20.748493	22.084629	21.357100	21.083121
806	0.491553	0.482248	21.780493	20.748493	22.084629	21.357100
807	0.425933	0.466674	20.084590	21.780493	20.748493	22.084629
808	0.432588	0.432245	20.684784	20.084590	21.780493	20.748493
809	0.478652	0.399032	20.437626	20.684784	20.084590	21.780493
810	0.417527	0.411619	19.891237	20.437626	20.684784	20.084590
811	0.362577	0.388918	19.364158	19.891237	20.437626	20.684784
812	0.468116	0.405155	19.563906	19.364158	19.891237	20.437626
813	0.451515	0.432849	19.203645	19.563906	19.364158	19.891237
814	0.443514	0.328303	19.461319	19.203645	19.563906	19.364158
815	0.334215	0.356566	19.900825	19.461319	19.203645	19.563906
816	0.421255	0.327362	18.241676	19.900825	19.461319	19.203645
817	0.322411	0.344804	18.690212	18.241676	19.900825	19.461319

	t-6	t-7	t-8	t-9	...	weekday(t-5)	\
479	21.680604	21.506662	22.125331	23.263682	...	4.0	
480	20.990240	21.680604	21.506662	22.125331	...	5.0	
481	21.958630	20.990240	21.680604	21.506662	...	6.0	
482	25.222896	21.958630	20.990240	21.680604	...	7.0	
483	26.045695	25.222896	21.958630	20.990240	...	1.0	
484	24.921571	26.045695	25.222896	21.958630	...	2.0	
485	24.113429	24.921571	26.045695	25.222896	...	3.0	
486	23.039379	24.113429	24.921571	26.045695	...	4.0	
487	22.439529	23.039379	24.113429	24.921571	...	5.0	
488	22.403817	22.439529	23.039379	24.113429	...	6.0	
489	22.014359	22.403817	22.439529	23.039379	...	7.0	
490	22.982863	22.014359	22.403817	22.439529	...	1.0	
491	22.445216	22.982863	22.014359	22.403817	...	2.0	
492	21.084595	22.445216	22.982863	22.014359	...	3.0	

493	22.628582	21.084595	22.445216	22.982863	...	4.0
494	23.569281	22.628582	21.084595	22.445216	...	5.0
495	21.345399	23.569281	22.628582	21.084595	...	6.0
496	19.956105	21.345399	23.569281	22.628582	...	7.0
497	20.366954	19.956105	21.345399	23.569281	...	1.0
498	19.986454	20.366954	19.956105	21.345399	...	2.0
499	20.797592	19.986454	20.366954	19.956105	...	3.0
500	19.617197	20.797592	19.986454	20.366954	...	4.0
501	20.448829	19.617197	20.797592	19.986454	...	5.0
502	19.387875	20.448829	19.617197	20.797592	...	6.0
503	19.712296	19.387875	20.448829	19.617197	...	7.0
504	18.183355	19.712296	19.387875	20.448829	...	1.0
505	18.132039	18.183355	19.712296	19.387875	...	2.0
506	17.904697	18.132039	18.183355	19.712296	...	3.0
507	17.741276	17.904697	18.132039	18.183355	...	4.0
508	17.384980	17.741276	17.904697	18.132039	...	5.0
...	...	...	...	...	...	...
788	21.951631	20.758440	21.725307	21.586829	...	5.0
789	21.288113	21.951631	20.758440	21.725307	...	6.0
790	22.056206	21.288113	21.951631	20.758440	...	7.0
791	23.947411	22.056206	21.288113	21.951631	...	1.0
792	22.459621	23.947411	22.056206	21.288113	...	2.0
793	21.197113	22.459621	23.947411	22.056206	...	3.0
794	22.076482	21.197113	22.459621	23.947411	...	4.0
795	22.490156	22.076482	21.197113	22.459621	...	5.0
796	21.578979	22.490156	22.076482	21.197113	...	6.0
797	21.769440	21.578979	22.490156	22.076482	...	7.0
798	22.128730	21.769440	21.578979	22.490156	...	1.0
799	20.850475	22.128730	21.769440	21.578979	...	2.0
800	20.586582	20.850475	22.128730	21.769440	...	3.0
801	20.563536	20.586582	20.850475	22.128730	...	4.0
802	20.609100	20.563536	20.586582	20.850475	...	5.0
803	20.211364	20.609100	20.563536	20.586582	...	6.0
804	21.177479	20.211364	20.609100	20.563536	...	7.0
805	22.644650	21.177479	20.211364	20.609100	...	1.0
806	21.083121	22.644650	21.177479	20.211364	...	2.0
807	21.357100	21.083121	22.644650	21.177479	...	3.0
808	22.084629	21.357100	21.083121	22.644650	...	4.0
809	20.748493	22.084629	21.357100	21.083121	...	5.0
810	21.780493	20.748493	22.084629	21.357100	...	6.0
811	20.084590	21.780493	20.748493	22.084629	...	7.0
812	20.684784	20.084590	21.780493	20.748493	...	1.0
813	20.437626	20.684784	20.084590	21.780493	...	2.0
814	19.891237	20.437626	20.684784	20.084590	...	3.0
815	19.364158	19.891237	20.437626	20.684784	...	4.0
816	19.563906	19.364158	19.891237	20.437626	...	5.0
817	19.203645	19.563906	19.364158	19.891237	...	6.0

	weekday(t-6)	weekday(t-7)	weekday(t-8)	weekday(t-9)	weekday(t-10)	\
479	3.0	2.0	1.0	7.0	6.0	
480	4.0	3.0	2.0	1.0	7.0	
481	5.0	4.0	3.0	2.0	1.0	
482	6.0	5.0	4.0	3.0	2.0	
483	7.0	6.0	5.0	4.0	3.0	
484	1.0	7.0	6.0	5.0	4.0	
485	2.0	1.0	7.0	6.0	5.0	
486	3.0	2.0	1.0	7.0	6.0	
487	4.0	3.0	2.0	1.0	7.0	
488	5.0	4.0	3.0	2.0	1.0	
489	6.0	5.0	4.0	3.0	2.0	
490	7.0	6.0	5.0	4.0	3.0	
491	1.0	7.0	6.0	5.0	4.0	
492	2.0	1.0	7.0	6.0	5.0	
493	3.0	2.0	1.0	7.0	6.0	
494	4.0	3.0	2.0	1.0	7.0	
495	5.0	4.0	3.0	2.0	1.0	
496	6.0	5.0	4.0	3.0	2.0	
497	7.0	6.0	5.0	4.0	3.0	
498	1.0	7.0	6.0	5.0	4.0	
499	2.0	1.0	7.0	6.0	5.0	
500	3.0	2.0	1.0	7.0	6.0	
501	4.0	3.0	2.0	1.0	7.0	
502	5.0	4.0	3.0	2.0	1.0	
503	6.0	5.0	4.0	3.0	2.0	
504	7.0	6.0	5.0	4.0	3.0	
505	1.0	7.0	6.0	5.0	4.0	
506	2.0	1.0	7.0	6.0	5.0	
507	3.0	2.0	1.0	7.0	6.0	
508	4.0	3.0	2.0	1.0	7.0	
..	...	...	...	...	...	
788	4.0	3.0	2.0	1.0	7.0	
789	5.0	4.0	3.0	2.0	1.0	
790	6.0	5.0	4.0	3.0	2.0	
791	7.0	6.0	5.0	4.0	3.0	
792	1.0	7.0	6.0	5.0	4.0	
793	2.0	1.0	7.0	6.0	5.0	
794	3.0	2.0	1.0	7.0	6.0	
795	4.0	3.0	2.0	1.0	7.0	
796	5.0	4.0	3.0	2.0	1.0	
797	6.0	5.0	4.0	3.0	2.0	
798	7.0	6.0	5.0	4.0	3.0	
799	1.0	7.0	6.0	5.0	4.0	
800	2.0	1.0	7.0	6.0	5.0	
801	3.0	2.0	1.0	7.0	6.0	
802	4.0	3.0	2.0	1.0	7.0	
803	5.0	4.0	3.0	2.0	1.0	

804	6.0	5.0	4.0	3.0	2.0
805	7.0	6.0	5.0	4.0	3.0
806	1.0	7.0	6.0	5.0	4.0
807	2.0	1.0	7.0	6.0	5.0
808	3.0	2.0	1.0	7.0	6.0
809	4.0	3.0	2.0	1.0	7.0
810	5.0	4.0	3.0	2.0	1.0
811	6.0	5.0	4.0	3.0	2.0
812	7.0	6.0	5.0	4.0	3.0
813	1.0	7.0	6.0	5.0	4.0
814	2.0	1.0	7.0	6.0	5.0
815	3.0	2.0	1.0	7.0	6.0
816	4.0	3.0	2.0	1.0	7.0
817	5.0	4.0	3.0	2.0	1.0

	weekday(t-11)	weekday(t-12)	weekday(t-13)	weekday(t-14)
479	5.0	4.0	3.0	2.0
480	6.0	5.0	4.0	3.0
481	7.0	6.0	5.0	4.0
482	1.0	7.0	6.0	5.0
483	2.0	1.0	7.0	6.0
484	3.0	2.0	1.0	7.0
485	4.0	3.0	2.0	1.0
486	5.0	4.0	3.0	2.0
487	6.0	5.0	4.0	3.0
488	7.0	6.0	5.0	4.0
489	1.0	7.0	6.0	5.0
490	2.0	1.0	7.0	6.0
491	3.0	2.0	1.0	7.0
492	4.0	3.0	2.0	1.0
493	5.0	4.0	3.0	2.0
494	6.0	5.0	4.0	3.0
495	7.0	6.0	5.0	4.0
496	1.0	7.0	6.0	5.0
497	2.0	1.0	7.0	6.0
498	3.0	2.0	1.0	7.0
499	4.0	3.0	2.0	1.0
500	5.0	4.0	3.0	2.0
501	6.0	5.0	4.0	3.0
502	7.0	6.0	5.0	4.0
503	1.0	7.0	6.0	5.0
504	2.0	1.0	7.0	6.0
505	3.0	2.0	1.0	7.0
506	4.0	3.0	2.0	1.0
507	5.0	4.0	3.0	2.0
508	6.0	5.0	4.0	3.0
..	...	...	...	...
788	6.0	5.0	4.0	3.0

789	7.0	6.0	5.0	4.0
790	1.0	7.0	6.0	5.0
791	2.0	1.0	7.0	6.0
792	3.0	2.0	1.0	7.0
793	4.0	3.0	2.0	1.0
794	5.0	4.0	3.0	2.0
795	6.0	5.0	4.0	3.0
796	7.0	6.0	5.0	4.0
797	1.0	7.0	6.0	5.0
798	2.0	1.0	7.0	6.0
799	3.0	2.0	1.0	7.0
800	4.0	3.0	2.0	1.0
801	5.0	4.0	3.0	2.0
802	6.0	5.0	4.0	3.0
803	7.0	6.0	5.0	4.0
804	1.0	7.0	6.0	5.0
805	2.0	1.0	7.0	6.0
806	3.0	2.0	1.0	7.0
807	4.0	3.0	2.0	1.0
808	5.0	4.0	3.0	2.0
809	6.0	5.0	4.0	3.0
810	7.0	6.0	5.0	4.0
811	1.0	7.0	6.0	5.0
812	2.0	1.0	7.0	6.0
813	3.0	2.0	1.0	7.0
814	4.0	3.0	2.0	1.0
815	5.0	4.0	3.0	2.0
816	6.0	5.0	4.0	3.0
817	7.0	6.0	5.0	4.0

[339 rows x 71 columns]

In [31]: *# Convert predictions back to normal values*

```

predi = scaler.inverse_transform(prova)
print(predi)
print(predi[0][0])
print(predi[0][1])

```

*#Les variables en posició 0 i 1 són predicció i y respectivament*

```

[[ 23.59655298  24.11342857 426.37647593 ... 25.          19.
   13.          ]
 [ 22.72345833  23.03937907 408.53664713 ... 31.          25.
   19.          ]
 [ 22.24334548  22.43952941 395.71142697 ... 37.          31.
   25.          ]
 ...

```

```
[ 18.33550093  18.69021166 328.85744068 ... 25.          19.
 13.          ]
[ 19.71682464  18.22675182 302.52677042 ... 31.          25.
 19.          ]
[ 18.14817794  18.50356205 309.64502008 ... 37.          31.
 25.          ]]
23.596552976565345
24.113428573376602
```

In [32]: *#Fem una llista amb les prediccions i una llista amb y(valor real)*

```
listpredi=list()
for i in range(len(predi)):
    listpredi.append(predi[i][0])
listpredi

listy=list()
for i in range(len(predi)):
    listy.append(predi[i][1])
listy
```

Out [32]: [24.113428573376602,  
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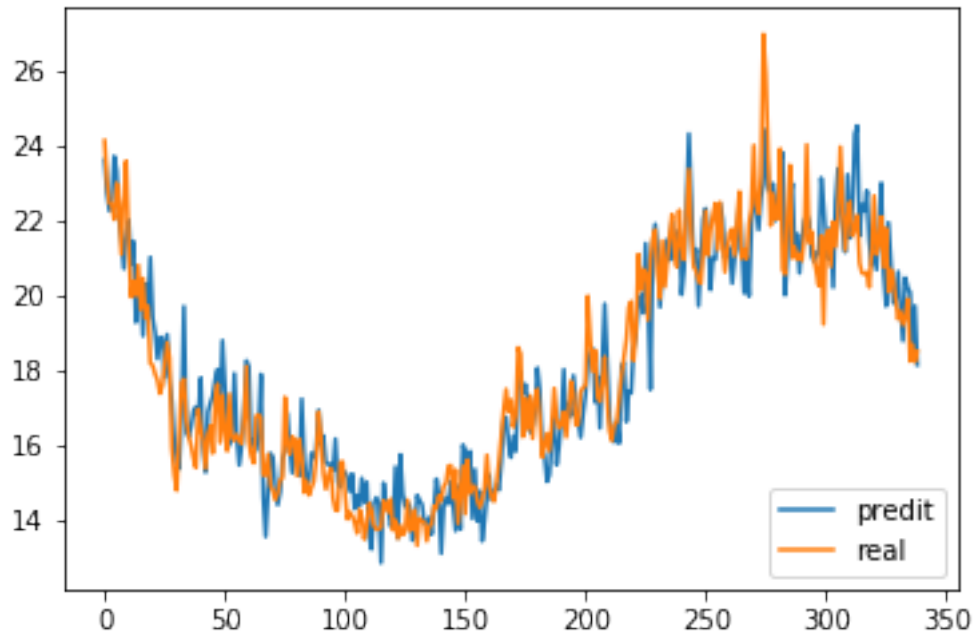
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18.5035620452555]
```

```
In [33]: ##Mostrem  
plt.plot(listpredi, label="predict")  
plt.plot(listy, label="real")  
plt.legend(loc="lower right")  
plt.show()
```



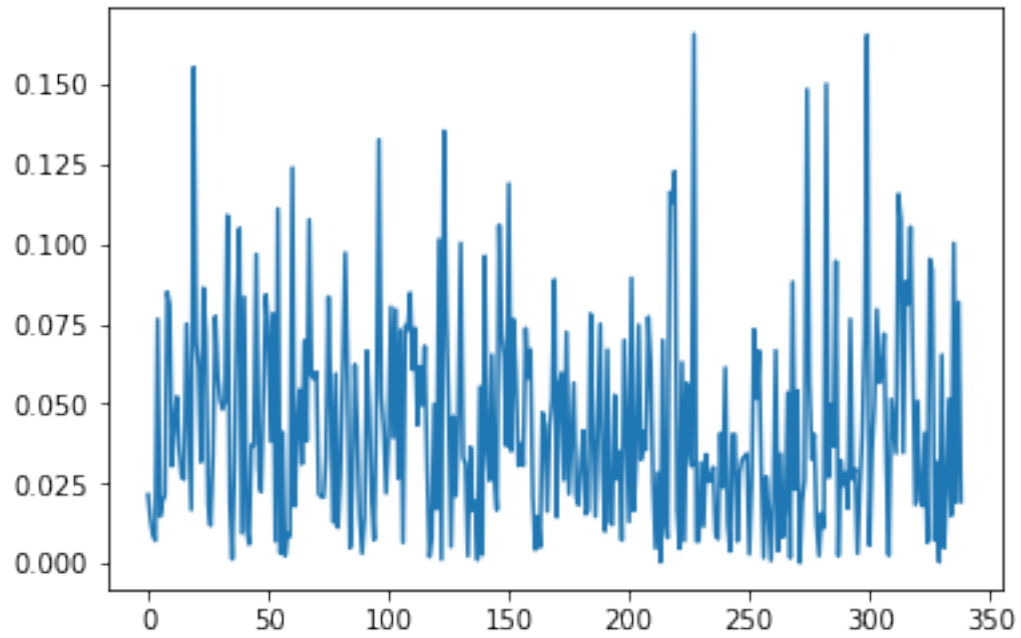
```
In [34]: llista_errors=list()
         llista_errorsabs=list()
         llista_errorsres=list()

         for i in range(len(listpredi)):
             valor=listy[i]-listpredi[i]
             valorabs=math.fabs(valor)
             valorrespecte=valorabs/listy[i]
             llista_errors.append(valor)
             llista_errorsabs.append(valorabs)
             llista_errorsres.append(valorrespecte)

         plt.plot(llista_errorsres)

         error_mitja=sum(llista_errorsres)/(len(llista_errorsres))*100
         print("L'error mitjà és de {} % ".format(error_mitja))
```

L'error mitjà és de 4.318432766423696 %



In [ ]: