M17
_Xarxa_walkforard_normalitzat_multivariate2tempmin_presioweekda

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

```
In [2]: daily=pd.read_csv('C:/Users/Laura/Desktop/Smart meters London/workspace R/Dades netes/I
        daily.head(5)

Out[2]:         date  apparentTemperatureMax  apparentTemperatureMin  sunsetTimeHour  \
        0  2014-02-08                    5.67                    2.19              17
        1  2013-12-24                   11.93                    2.68              15
        2  2012-11-01                   11.46                    0.85              16
        3  2014-02-05                    5.86                    1.03              16
        4  2012-04-17                   10.01                    2.76              19

           weekday  season  cloudCover  humidity  visibility  month  dewPoint  \
        0        6  winter        0.47      0.77       11.20      2      3.99
```

```
         1        2  winter          0.40      0.81      10.86      12      5.42
         2        4  autumn          0.44      0.85      12.54      11      5.06
         3        3  winter          0.73      0.77      10.91       2      4.06
         4        2  spring          0.60      0.87      11.86       4      5.74


            pressure   energy_sum
         0    979.25    11.569300
         1    979.52    11.981672
         2    979.63    10.781689
         3    982.20    11.415105
         4    982.22    10.617443
```

In [3]: *#Ens quedem amb date i energy_sum, ordenem valors per data i resetejem index*
daily_dia=daily[['date','energy_sum','apparentTemperatureMax','apparentTemperatureMin'
daily_dia.head(5)

```
Out[3]:    index         date  energy_sum  apparentTemperatureMax  \
        0    735   2011-11-23    6.952692                   10.36
        1    736   2011-11-24    8.536480                   12.93
        2    682   2011-11-25    9.499781                   13.03
        3    713   2011-11-26   10.267707                   12.96
        4    609   2011-11-27   10.850805                   13.54


            apparentTemperatureMin   humidity   pressure   weekday
        0                     2.18       0.93    1027.12         3
        1                     7.01       0.89    1027.22         4
        2                     4.84       0.79    1024.47         5
        3                     4.69       0.81    1025.80         6
        4                     2.94       0.72    1021.11         7
```

In [18]: plt.plot(daily_dia.energy_sum)

Out[18]: [<matplotlib.lines.Line2D at 0x1d48d92d710>]

```
In [4]: 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)
```

```python
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['pres(t-1)']=daily_dia['pressure'].shift(1)
daily_dia['pres(t-2)']=daily_dia['pressure'].shift(2)
daily_dia['pres(t-3)']=daily_dia['pressure'].shift(3)
daily_dia['pres(t-4)']=daily_dia['pressure'].shift(4)
daily_dia['pres(t-5)']=daily_dia['pressure'].shift(5)
daily_dia['pres(t-6)']=daily_dia['pressure'].shift(6)
daily_dia['pres(t-7)']=daily_dia['pressure'].shift(7)
daily_dia['pres(t-8)']=daily_dia['pressure'].shift(8)
daily_dia['pres(t-9)']=daily_dia['pressure'].shift(9)
daily_dia['pres(t-10)']=daily_dia['pressure'].shift(10)
daily_dia['pres(t-11)']=daily_dia['pressure'].shift(11)
daily_dia['pres(t-12)']=daily_dia['pressure'].shift(12)
daily_dia['pres(t-13)']=daily_dia['pressure'].shift(13)
daily_dia['pres(t-14)']=daily_dia['pressure'].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[4]:      index        date  energy_sum  apparentTemperatureMax  \
        0      735  2011-11-23    6.952692                   10.36
        1      736  2011-11-24    8.536480                   12.93
        2      682  2011-11-25    9.499781                   13.03
        3      713  2011-11-26   10.267707                   12.96
        4      609  2011-11-27   10.850805                   13.54
        5      641  2011-11-28    9.103382                   12.58
        6      265  2011-11-29    9.274873                   13.47
        7      571  2011-11-30    8.813513                   11.87
        8      199  2011-12-01    9.227707                   12.15
        9      338  2011-12-02   10.145910                    5.33
        10     131  2011-12-03   10.780273                   11.42
        11     100  2011-12-04   12.163127                    6.66
        12     176  2011-12-05   10.609714                    3.13
        13     203  2011-12-06   11.673417                    3.77
        14     240  2011-12-07   10.889362                    5.14
        15     299  2011-12-08   11.525150                   12.89
        16     294  2011-12-09   11.759837                    3.99
        17     455  2011-12-10   12.633801                    3.14
        18     215  2011-12-11   13.749174                    5.72
        19     115  2011-12-12   11.951958                    5.94
        20      22  2011-12-13   11.957446                   12.08
        21      45  2011-12-14   12.392776                    2.88
        22      59  2011-12-15   12.307079                    4.38
        23      11  2011-12-16   13.376080                    0.99
        24     228  2011-12-17   13.511968                    1.72
        25     478  2011-12-18   14.732271                    1.98
        26     412  2011-12-19   13.774471                    4.02
```

```
27    433  2011-12-20   12.709106                        4.98
28    524  2011-12-21   12.148570                       12.14
29    689  2011-12-22   11.839403                       12.14
..    ...         ...        ...                          ...
800    41  2014-01-29   11.800777                        2.53
801   105  2014-01-30   11.685169                        5.86
802    80  2014-01-31   11.857957                        5.27
803    21  2014-02-01   11.710582                        6.86
804   163  2014-02-02   12.078164                        6.48
805   135  2014-02-03   11.280011                        4.59
806    60  2014-02-04   11.095584                        5.63
807     3  2014-02-05   11.415105                        5.86
808    18  2014-02-06   11.445403                        7.34
809    14  2014-02-07   10.972318                        8.44
810     0  2014-02-08   11.569300                        5.67
811     7  2014-02-09   12.202967                        3.91
812    35  2014-02-10   11.264175                        7.07
813    57  2014-02-11   11.452649                        4.06
814    44  2014-02-12   11.679099                        4.73
815    33  2014-02-13   11.285737                        3.42
816    23  2014-02-14   11.816914                       12.02
817    13  2014-02-15   11.490470                        5.79
818   187  2014-02-16   11.582159                        7.88
819   218  2014-02-17   10.979566                       10.67
820   235  2014-02-18   10.781898                       10.13
821   322  2014-02-19   10.674624                       10.13
822   101  2014-02-20   10.573835                       12.50
823   129  2014-02-21   10.518126                       10.15
824   248  2014-02-22   10.776242                       11.63
825   285  2014-02-23   11.480411                       11.94
826   158  2014-02-24   10.411403                       14.23
827    95  2014-02-25   10.294997                       11.43
828   360  2014-02-26   10.202945                       11.29
829   197  2014-02-27   10.356350                       10.31


    apparentTemperatureMin  humidity  pressure  weekday         t-1  \
0                     2.18      0.93   1027.12        3         NaN
1                     7.01      0.89   1027.22        4    6.952692
2                     4.84      0.79   1024.47        5    8.536480
3                     4.69      0.81   1025.80        6    9.499781
4                     2.94      0.72   1021.11        7   10.267707
5                     1.31      0.86   1022.80        1   10.850805
6                     3.39      0.82   1009.70        2    9.103382
7                     3.34      0.78   1019.43        3    9.274873
8                     5.29      0.82   1007.12        4    8.813513
9                     0.46      0.87   1012.12        5    9.227707
10                    4.71      0.79   1003.55        6   10.145910
11                    1.03      0.82   1001.15        7   10.780273
```

12	−1.69	0.77	1006.01	1	12.163127
13	−1.61	0.83	1007.32	2	10.609714
14	0.94	0.68	1008.76	3	11.673417
15	0.63	0.81	1010.84	4	10.889362
16	−1.42	0.71	1010.60	5	11.525150
17	−3.42	0.81	1015.58	6	11.759837
18	0.11	0.88	1007.71	7	12.633801
19	−0.64	0.84	1002.47	1	13.749174
20	0.22	0.75	990.27	2	11.951958
21	0.78	0.79	994.48	3	11.957446
22	1.07	0.77	996.75	4	12.392776
23	−2.65	0.88	988.10	5	12.307079
24	−3.56	0.86	1008.46	6	13.376080
25	−4.12	0.84	1016.37	7	13.511968
26	−3.67	0.94	1014.39	1	14.732271
27	1.68	0.81	1015.09	2	13.774471
28	3.84	0.94	1017.91	3	12.709106
29	5.37	0.87	1024.71	4	12.148570
..	...	...	...	...	...
800	0.18	0.90	993.99	3	11.344805
801	0.61	0.91	1001.76	4	11.800777
802	0.29	0.91	998.51	5	11.685169
803	1.10	0.76	990.08	6	11.857957
804	3.21	0.72	1005.39	7	11.710582
805	1.96	0.79	1003.89	1	12.078164
806	1.12	0.75	996.87	2	11.280011
807	1.03	0.77	982.20	3	11.095584
808	1.96	0.82	989.90	4	11.415105
809	−0.86	0.79	988.77	5	11.445403
810	2.19	0.77	979.25	6	10.972318
811	1.38	0.66	984.71	7	11.569300
812	0.89	0.84	992.84	1	12.202967
813	−0.57	0.76	996.66	2	11.264175
814	−1.20	0.75	994.27	3	11.452649
815	0.05	0.68	992.43	4	11.679099
816	0.45	0.81	990.31	5	11.285737
817	1.77	0.69	988.63	6	11.816914
818	−1.03	0.76	1006.70	7	11.490470
819	2.84	0.83	1007.80	1	11.582159
820	3.83	0.87	1008.67	2	10.979566
821	2.65	0.87	1011.57	3	10.781898
822	3.95	0.84	1001.54	4	10.674624
823	0.19	0.72	1003.42	5	10.573835
824	1.59	0.71	1009.09	6	10.518126
825	5.53	0.76	1010.37	7	10.776242
826	5.52	0.74	1005.19	1	11.480411
827	3.89	0.78	1000.65	2	10.411403
828	1.67	0.73	1012.73	3	10.294997

```
829                       1.41      0.74    1007.02        4   10.202945

           t-2   ...  weekday(t-5)  weekday(t-6)  weekday(t-7)  weekday(t-8)  \
0          NaN   ...          NaN           NaN           NaN           NaN
1          NaN   ...          NaN           NaN           NaN           NaN
2     6.952692   ...          NaN           NaN           NaN           NaN
3     8.536480   ...          NaN           NaN           NaN           NaN
4     9.499781   ...          NaN           NaN           NaN           NaN
5    10.267707   ...          3.0           NaN           NaN           NaN
6    10.850805   ...          4.0           3.0           NaN           NaN
7     9.103382   ...          5.0           4.0           3.0           NaN
8     9.274873   ...          6.0           5.0           4.0           3.0
9     8.813513   ...          7.0           6.0           5.0           4.0
10    9.227707   ...          1.0           7.0           6.0           5.0
11   10.145910   ...          2.0           1.0           7.0           6.0
12   10.780273   ...          3.0           2.0           1.0           7.0
13   12.163127   ...          4.0           3.0           2.0           1.0
14   10.609714   ...          5.0           4.0           3.0           2.0
15   11.673417   ...          6.0           5.0           4.0           3.0
16   10.889362   ...          7.0           6.0           5.0           4.0
17   11.525150   ...          1.0           7.0           6.0           5.0
18   11.759837   ...          2.0           1.0           7.0           6.0
19   12.633801   ...          3.0           2.0           1.0           7.0
20   13.749174   ...          4.0           3.0           2.0           1.0
21   11.951958   ...          5.0           4.0           3.0           2.0
22   11.957446   ...          6.0           5.0           4.0           3.0
23   12.392776   ...          7.0           6.0           5.0           4.0
24   12.307079   ...          1.0           7.0           6.0           5.0
25   13.376080   ...          2.0           1.0           7.0           6.0
26   13.511968   ...          3.0           2.0           1.0           7.0
27   14.732271   ...          4.0           3.0           2.0           1.0
28   13.774471   ...          5.0           4.0           3.0           2.0
29   12.709106   ...          6.0           5.0           4.0           3.0
..         ...   ...          ...           ...           ...           ...
800  11.753871   ...          5.0           4.0           3.0           2.0
801  11.344805   ...          6.0           5.0           4.0           3.0
802  11.800777   ...          7.0           6.0           5.0           4.0
803  11.685169   ...          1.0           7.0           6.0           5.0
804  11.857957   ...          2.0           1.0           7.0           6.0
805  11.710582   ...          3.0           2.0           1.0           7.0
806  12.078164   ...          4.0           3.0           2.0           1.0
807  11.280011   ...          5.0           4.0           3.0           2.0
808  11.095584   ...          6.0           5.0           4.0           3.0
809  11.415105   ...          7.0           6.0           5.0           4.0
810  11.445403   ...          1.0           7.0           6.0           5.0
811  10.972318   ...          2.0           1.0           7.0           6.0
812  11.569300   ...          3.0           2.0           1.0           7.0
813  12.202967   ...          4.0           3.0           2.0           1.0
```

```
814  11.264175  ...      5.0       4.0       3.0       2.0
815  11.452649  ...      6.0       5.0       4.0       3.0
816  11.679099  ...      7.0       6.0       5.0       4.0
817  11.285737  ...      1.0       7.0       6.0       5.0
818  11.816914  ...      2.0       1.0       7.0       6.0
819  11.490470  ...      3.0       2.0       1.0       7.0
820  11.582159  ...      4.0       3.0       2.0       1.0
821  10.979566  ...      5.0       4.0       3.0       2.0
822  10.781898  ...      6.0       5.0       4.0       3.0
823  10.674624  ...      7.0       6.0       5.0       4.0
824  10.573835  ...      1.0       7.0       6.0       5.0
825  10.518126  ...      2.0       1.0       7.0       6.0
826  10.776242  ...      3.0       2.0       1.0       7.0
827  11.480411  ...      4.0       3.0       2.0       1.0
828  10.411403  ...      5.0       4.0       3.0       2.0
829  10.294997  ...      6.0       5.0       4.0       3.0

      weekday(t-9)  weekday(t-10)  weekday(t-11)  weekday(t-12)  weekday(t-13)  \
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             3.0            NaN            NaN            NaN            NaN
10            4.0            3.0            NaN            NaN            NaN
11            5.0            4.0            3.0            NaN            NaN
12            6.0            5.0            4.0            3.0            NaN
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
```

..	...	...	...	...	...
800	1.0	7.0	6.0	5.0	4.0
801	2.0	1.0	7.0	6.0	5.0
802	3.0	2.0	1.0	7.0	6.0
803	4.0	3.0	2.0	1.0	7.0
804	5.0	4.0	3.0	2.0	1.0
805	6.0	5.0	4.0	3.0	2.0
806	7.0	6.0	5.0	4.0	3.0
807	1.0	7.0	6.0	5.0	4.0
808	2.0	1.0	7.0	6.0	5.0
809	3.0	2.0	1.0	7.0	6.0
810	4.0	3.0	2.0	1.0	7.0
811	5.0	4.0	3.0	2.0	1.0
812	6.0	5.0	4.0	3.0	2.0
813	7.0	6.0	5.0	4.0	3.0
814	1.0	7.0	6.0	5.0	4.0
815	2.0	1.0	7.0	6.0	5.0
816	3.0	2.0	1.0	7.0	6.0
817	4.0	3.0	2.0	1.0	7.0
818	5.0	4.0	3.0	2.0	1.0
819	6.0	5.0	4.0	3.0	2.0
820	7.0	6.0	5.0	4.0	3.0
821	1.0	7.0	6.0	5.0	4.0
822	2.0	1.0	7.0	6.0	5.0
823	3.0	2.0	1.0	7.0	6.0
824	4.0	3.0	2.0	1.0	7.0
825	5.0	4.0	3.0	2.0	1.0
826	6.0	5.0	4.0	3.0	2.0
827	7.0	6.0	5.0	4.0	3.0
828	1.0	7.0	6.0	5.0	4.0
829	2.0	1.0	7.0	6.0	5.0

	weekday(t-14)
0	NaN
1	NaN
2	NaN
3	NaN
4	NaN
5	NaN
6	NaN
7	NaN
8	NaN
9	NaN
10	NaN
11	NaN
12	NaN
13	NaN
14	3.0

```
15          4.0
16          5.0
17          6.0
18          7.0
19          1.0
20          2.0
21          3.0
22          4.0
23          5.0
24          6.0
25          7.0
26          1.0
27          2.0
28          3.0
29          4.0
..          ...
800         3.0
801         4.0
802         5.0
803         6.0
804         7.0
805         1.0
806         2.0
807         3.0
808         4.0
809         5.0
810         6.0
811         7.0
812         1.0
813         2.0
814         3.0
815         4.0
816         5.0
817         6.0
818         7.0
819         1.0
820         2.0
821         3.0
822         4.0
823         5.0
824         6.0
825         7.0
826         1.0
827         2.0
828         3.0
829         4.0

[830 rows x 92 columns]
```

```
In [6]: #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(['index','date','apparentTemperatureMax','apparentTemperatureM
        daily_dia.head(5)

Out[6]:    energy_sum         t-1       t-2       t-3       t-4  t-5  t-6  t-7  t-8  \
        0   6.952692         NaN       NaN       NaN       NaN  NaN  NaN  NaN  NaN
        1   8.536480    6.952692       NaN       NaN       NaN  NaN  NaN  NaN  NaN
        2   9.499781    8.536480  6.952692       NaN       NaN  NaN  NaN  NaN  NaN
        3  10.267707    9.499781  8.536480  6.952692       NaN  NaN  NaN  NaN  NaN
        4  10.850805   10.267707  9.499781  8.536480  6.952692  NaN  NaN  NaN  NaN

           t-9  ...  weekday(t-5)  weekday(t-6)  weekday(t-7)  weekday(t-8)  \
        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-9)  weekday(t-10)  weekday(t-11)  weekday(t-12)  weekday(t-13)  \
        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-14)
        0           NaN
        1           NaN
        2           NaN
        3           NaN
        4           NaN

        [5 rows x 85 columns]

In [7]: #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[7]:    energy_sum         t-1        t-2        t-3        t-4        t-5  \
        14   10.889362  11.673417  10.609714  12.163127  10.780273  10.145910
        15   11.525150  10.889362  11.673417  10.609714  12.163127  10.780273
        16   11.759837  11.525150  10.889362  11.673417  10.609714  12.163127
        17   12.633801  11.759837  11.525150  10.889362  11.673417  10.609714
        18   13.749174  12.633801  11.759837  11.525150  10.889362  11.673417

                 t-6        t-7        t-8        t-9  ...  weekday(t-5)  \
```

```
14   9.227707    8.813513    9.274873    9.103382   ...              5.0
15  10.145910    9.227707    8.813513    9.274873   ...              6.0
16  10.780273   10.145910    9.227707    8.813513   ...              7.0
17  12.163127   10.780273   10.145910    9.227707   ...              1.0
18  10.609714   12.163127   10.780273   10.145910   ...              2.0

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

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

[5 rows x 85 columns]
```

In [7]: `len(daily_dia)`

Out[7]: 816

In [8]:
```
#normalitzem
scaler=preprocessing.MinMaxScaler(feature_range=(0, 1))
daily_dia_norm=scaler.fit_transform(daily_dia)
```

In [9]:
```
#Seleccionem dades per test i train
y_daily=daily_dia_norm[:,0]
X_daily=daily_dia_norm[:,1:85]

#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], 14,6))
```

In [10]:
```
# definim model
import tensorflow as tf
model =Sequential()
model.add(LSTM(50, activation='relu', input_shape=(14, 6)))
model.add(Dense(1))
model.compile(optimizer='adam', loss='mse', metrics=['accuracy'])
```

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


In [11]: 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, preditrain))
             llista_scoretrain.append(trainScore )


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

             sumScores=sumScores+testScore

WARNING:tensorflow:From c:\users\laura\appdata\local\programs\python\python37\lib\site-packages
```

```
Instructions for updating:
Use tf.cast instead.
```

In [12]: *#Dividim la suma de scores de test entre el nombre de prediccions per obtenir la mitj*
         sumScores/(lenght-n_train)

Out[12]: 0.0317091626629352

In [13]: llista_scores

Out[13]: [0.03299787566829249,
          0.11636547468509462,
          0.012165755265237443,
          0.018730171579459443,
          0.03745906489044781,
          0.06955704660499618,
          0.027738907041167105,
          0.14017563558912993,
          0.17222381048689162,
          0.04706032515208358,
          0.12396687028050479,
          0.03747159352733154,
          0.002582128222313518,
          0.03131228238337935,
          0.030609546659727593,
          0.048901944359987626,
          0.03699430040066565,
          0.10194819382374609,
          0.06147252947937076,
          0.06258198074398913,
          0.05714449842552649,
          0.07383032425678704,
          0.06601554651412278,
          0.022954955955670098,
          0.02859531355378153,
          0.019981535537170192,
          0.06628314483505848,
          0.06787335160519214,
          0.0076929181821459025,
          0.023045431388547533,
          0.06251360810501483,
          0.07454879225639566,
          0.13215296569249246,
          0.12480040064662257,
          0.1358857542305274,
          0.0056225501691054,
          0.033857340912644585,
          0.03134557001417404,

                              15
```

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0.014861024239559484,
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0.029073557525570726,
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0.07125855332973852,
0.007394809576265704,
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0.037784642531377366,
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0.023649529376460587,
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0.02395476259962126,
0.058618567482139894,
0.08190258920249616,
0.031039471990637613,
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0.02622664252749507,
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0.013166945811966424,
0.011275298845545234,
0.1162366760521969,
0.010001585129592372,
0.02623284059523323,
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```
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```
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    0.02952052771780167,
    0.10408503560623017,
    0.045212296106489136,
    0.02403017773404681,
    0.06601383788913529,
    0.03999181949471531,
    0.059043569232121174,
    0.0455894031199342,
    0.03031083801304768,
    0.002597765763071802,
    0.057200650222821725,
    0.04661021673720245,
    0.002740253646000612,
    0.006699398545665147,
    0.023979831688605957,
    0.0759456422193161,
    0.07419148062696146,
    0.04744241777864966,
    0.022273733905437743,
    0.026834162216187618]
```

In [14]: plt.plot(llista_scores)

Out[14]: [<matplotlib.lines.Line2D at 0x1e4190efac8>]

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```
In [15]: predis=list()
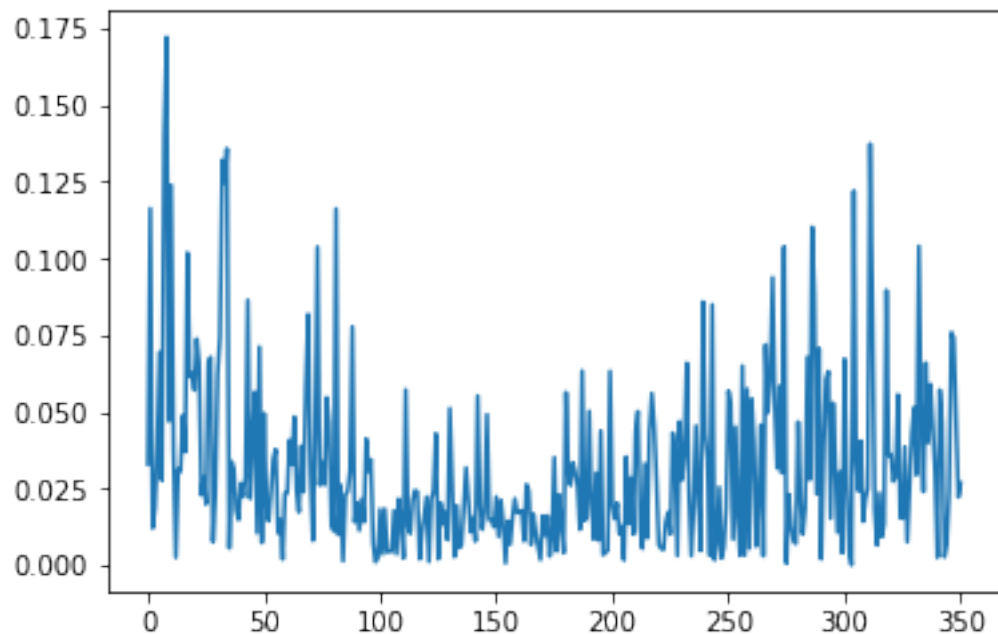
         for i in range(len(llista_prediccions)):
             predi=llista_prediccions[i].tolist()
             predis.append(predi)

         predis=np.reshape(predis, (351)  )

         predis
```

Out[15]: array([0.54705936, 0.46424308, 0.61216068, 0.52054936, 0.45389608,
        0.45258835, 0.47670263, 0.42754933, 0.54723597, 0.75757045,
        0.56074882, 0.62470502, 0.61261201, 0.59677833, 0.5550366 ,
        0.58542532, 0.51526201, 0.45030811, 0.49633679, 0.41521242,
        0.60833997, 0.656169 , 0.59578794, 0.48185933, 0.49432817,
        0.38264015, 0.50320107, 0.44792098, 0.39116699, 0.35487059,
        0.45823029, 0.41581461, 0.39246416, 0.37507886, 0.38051033,
        0.25817931, 0.30861893, 0.31020615, 0.35389423, 0.28543413,
        0.2138862 , 0.14701948, 0.17345706, 0.11337744, 0.26154587,
        0.2965754 , 0.17504452, 0.21780899, 0.13026564, 0.18253866,
        0.20626462, 0.23091274, 0.21699379, 0.15998481, 0.18207598,
        0.13136449, 0.20190193, 0.19477871, 0.2534253 , 0.29141161,
        0.22741804, 0.2161395 , 0.22034708, 0.25497314, 0.27398482,
        0.25887185, 0.28961936, 0.20277032, 0.2568911 , 0.12308826,
        0.24477321, 0.27877495, 0.25780556, 0.2820552 , 0.1488874 ,
        0.19034176, 0.21092026, 0.28500444, 0.2074172 , 0.17920895,
        0.18398668, 0.24173319, 0.12499133, 0.14047244, 0.10773203,
        0.14248949, 0.11894172, 0.21030694, 0.25509238, 0.17823388,
        0.16703658, 0.18507442, 0.15726133, 0.19986355, 0.2463536 ,
        0.16861431, 0.17043544, 0.10928117, 0.13399461, 0.12443355,
        0.17737877, 0.22187516, 0.17819643, 0.1202501 , 0.12155948,
        0.12897256, 0.1274773 , 0.12121277, 0.14284565, 0.13905548,
        0.13824661, 0.07738939, 0.10190544, 0.11991967, 0.13388284,
        0.17529088, 0.13341418, 0.09573334, 0.10637622, 0.1035162 ,
        0.11465017, 0.10772786, 0.17132643, 0.14466788, 0.07256578,
        0.12309544, 0.13329098, 0.11248006, 0.13175477, 0.14285965,
        0.08163814, 0.1107391 , 0.10224761, 0.09044126, 0.09533055,
        0.11449275, 0.15375941, 0.1343884 , 0.13446823, 0.09749316,
        0.08757983, 0.11885294, 0.13922046, 0.14092027, 0.12470818,
        0.09847889, 0.12109344, 0.06075113, 0.06396516, 0.09228882,
        0.13724168, 0.09798271, 0.10455852, 0.06690274, 0.09137278,
        0.08227544, 0.10687296, 0.11993296, 0.11332909, 0.09219977,
        0.09437017, 0.09988468, 0.10072412, 0.11590156, 0.15025064,
        0.11986049, 0.11730836, 0.08111327, 0.09089675, 0.09481616,
        0.08825553, 0.16948271, 0.09951469, 0.1182463 , 0.10703153,

                                23
```

```
        0.08562168, 0.14192636, 0.1249093 , 0.19413462, 0.19692278,
        0.13671596, 0.17609186, 0.20216247, 0.17203833, 0.22672021,
        0.35024986, 0.23103188, 0.18824071, 0.225694  , 0.22194433,
        0.25258249, 0.2504063 , 0.27335644, 0.23447466, 0.1789002 ,
        0.13133897, 0.1715371 , 0.17580098, 0.21930803, 0.33716184,
        0.22707227, 0.23075795, 0.19634326, 0.22160786, 0.20421541,
        0.24335507, 0.302095  , 0.20533435, 0.22739738, 0.22815123,
        0.21378934, 0.27203098, 0.30336761, 0.43889448, 0.37293577,
        0.28746197, 0.28979099, 0.33333105, 0.31051803, 0.32187402,
        0.34813911, 0.28296202, 0.26453957, 0.25847465, 0.26444077,
        0.25510815, 0.25019914, 0.31810156, 0.31994015, 0.27982163,
        0.3563571 , 0.29704922, 0.38237739, 0.30980396, 0.44988027,
        0.35334805, 0.37020206, 0.3678143 , 0.35448396, 0.30973399,
        0.43936849, 0.54465127, 0.45215476, 0.46654624, 0.41292411,
        0.41533726, 0.44986832, 0.48349762, 0.55231392, 0.47172451,
        0.40178406, 0.48886055, 0.52742815, 0.55018699, 0.54958922,
        0.61070836, 0.57652932, 0.50085616, 0.53908801, 0.44848138,
        0.50194561, 0.46778262, 0.58289826, 0.49773717, 0.44849801,
        0.48476177, 0.4671793 , 0.56547272, 0.61130571, 0.66265321,
        0.52398884, 0.45862424, 0.46868169, 0.54982358, 0.59578669,
        0.5310744 , 0.56540644, 0.45404971, 0.48135135, 0.48868132,
        0.54447865, 0.52445149, 0.56347138, 0.57179868, 0.49703217,
        0.52981108, 0.51014751, 0.60955411, 0.54527271, 0.56111717,
        0.55890524, 0.49969167, 0.48935252, 0.53035265, 0.48829865,
        0.44973803, 0.52526337, 0.61734146, 0.52425009, 0.47392654,
        0.51601779, 0.43509525, 0.48025292, 0.50841647, 0.52176344,
        0.52303755, 0.46102244, 0.50928295, 0.45685142, 0.48524892,
        0.48392808, 0.54473948, 0.41167647, 0.47149846, 0.46695411,
        0.4579477 , 0.48453522, 0.50383472, 0.55157983, 0.49644786,
        0.5228287 , 0.51009405, 0.49567154, 0.48820612, 0.54293752,
        0.58386922, 0.51802063, 0.45107329, 0.52010298, 0.4545255 ,
        0.49645495, 0.48213229, 0.47836483, 0.5227747 , 0.47458968,
        0.45790637, 0.5199632 , 0.48027414, 0.45725596, 0.54340029,
        0.44836193, 0.48088017, 0.45830441, 0.39769328, 0.38751   ,
        0.44702744, 0.42577589, 0.45647711, 0.41672242, 0.38126922,
        0.34930059])
```
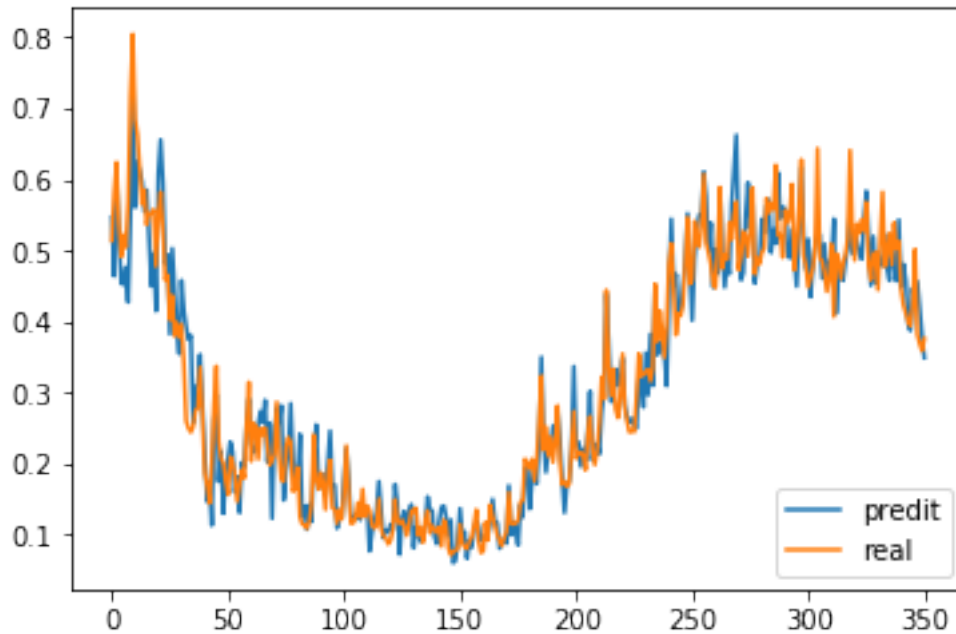
In [16]: `##Mostrem`
```python
plt.plot(predis, label="predit")
plt.plot(y_daily[n_train:lenght], label="real")
plt.legend(loc="lower right")
plt.show()
```

In [18]: *#Creem un dataset amb format (nombre prediccions,17) per tornar les prediccions i els*
#El necessitem d'questa 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 aleatories 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]
```

	predi	y	t-2	t-3	t-4	t-5 \
479	0.547059	0.514061	12.119938	12.852295	13.106773	12.823073
480	0.464243	0.580609	11.786082	12.119938	12.852295	13.106773
481	0.612161	0.624326	11.590859	11.786082	12.119938	12.852295
482	0.520549	0.539280	12.186487	11.590859	11.786082	12.119938
483	0.453896	0.491355	12.577783	12.186487	11.590859	11.786082
484	0.452588	0.522145	11.816573	12.577783	12.186487	11.590859
485	0.476703	0.504442	11.387627	11.816573	12.577783	12.186487
486	0.427549	0.567725	11.663214	11.387627	11.816573	12.577783
487	0.547236	0.719460	11.504756	11.663214	11.387627	11.816573
488	0.757570	0.804631	12.071173	11.504756	11.663214	11.387627
489	0.560749	0.684716	13.429271	12.071173	11.504756	11.663214
490	0.624705	0.662177	14.191591	13.429271	12.071173	11.504756
491	0.612612	0.615194	13.118295	14.191591	13.429271	12.071173
492	0.596778	0.565466	12.916559	13.118295	14.191591	13.429271
493	0.555037	0.585646	12.496044	12.916559	13.118295	14.191591
494	0.585425	0.536523	12.050954	12.496044	12.916559	13.118295
495	0.515262	0.552256	12.231576	12.050954	12.496044	12.916559
496	0.450308	0.552256	11.791904	12.231576	12.050954	12.496044
497	0.496337	0.557809	11.932721	11.791904	12.231576	12.050954
498	0.415212	0.477794	11.932721	11.932721	11.791904	12.231576
499	0.608340	0.551195	11.982423	11.932721	11.932721	11.791904
500	0.656169	0.582339	11.266252	11.982423	11.932721	11.932721
501	0.595788	0.529772	11.923226	11.266252	11.982423	11.932721
502	0.481859	0.458904	12.201972	11.923226	11.266252	11.982423
503	0.494328	0.465733	11.731479	12.201972	11.923226	11.266252
504	0.382640	0.402622	11.097177	11.731479	12.201972	11.923226
505	0.503201	0.436918	11.158295	11.097177	11.731479	12.201972
506	0.447921	0.380048	10.593420	11.158295	11.097177	11.731479
507	0.391167	0.398860	10.900388	10.593420	11.158295	11.097177
508	0.354871	0.377916	10.391372	10.900388	10.593420	11.158295
..	...	...	...	...	...	...
800	0.510094	0.537515	11.753871	12.729659	11.620778	11.409880
801	0.495672	0.524598	11.344805	11.753871	12.729659	11.620778
802	0.488206	0.543903	11.800777	11.344805	11.753871	12.729659
803	0.542938	0.527438	11.685169	11.800777	11.344805	11.753871
804	0.583869	0.568506	11.857957	11.685169	11.800777	11.344805
805	0.518021	0.479332	11.710582	11.857957	11.685169	11.800777
806	0.451073	0.458726	12.078164	11.710582	11.857957	11.685169
807	0.520103	0.494425	11.280011	12.078164	11.710582	11.857957
808	0.454526	0.497810	11.095584	11.280011	12.078164	11.710582

```
809   0.496455   0.444954   11.415105   11.095584   11.280011   12.078164
810   0.482132   0.511653   11.445403   11.415105   11.095584   11.280011
811   0.478365   0.582450   10.972318   11.445403   11.415105   11.095584
812   0.522775   0.477562   11.569300   10.972318   11.445403   11.415105
813   0.474590   0.498620   12.202967   11.569300   10.972318   11.445403
814   0.457906   0.523920   11.264175   12.202967   11.569300   10.972318
815   0.519963   0.479971   11.452649   11.264175   12.202967   11.569300
816   0.480274   0.539318   11.679099   11.452649   11.264175   12.202967
817   0.457256   0.502845   11.285737   11.679099   11.452649   11.264175
818   0.543400   0.513089   11.816914   11.285737   11.679099   11.452649
819   0.448362   0.445764   11.490470   11.816914   11.285737   11.679099
820   0.480880   0.423680   11.582159   11.490470   11.816914   11.285737
821   0.458304   0.411694   10.979566   11.582159   11.490470   11.816914
822   0.397693   0.400434   10.781898   10.979566   11.582159   11.490470
823   0.387510   0.394209   10.674624   10.781898   10.979566   11.582159
824   0.447027   0.423048   10.573835   10.674624   10.781898   10.979566
825   0.425776   0.501722   10.518126   10.573835   10.674624   10.781898
826   0.456477   0.382286   10.776242   10.518126   10.573835   10.674624
827   0.416722   0.369280   11.480411   10.776242   10.518126   10.573835
828   0.381269   0.358995   10.411403   11.480411   10.776242   10.518126
829   0.349301   0.376135   10.294997   10.411403   11.480411   10.776242

            t-6         t-7         t-8         t-9   ...   weekday(t-5)  \
479   11.559878   10.930170   10.889469   10.675248   ...            7.0
480   12.823073   11.559878   10.930170   10.889469   ...            1.0
481   13.106773   12.823073   11.559878   10.930170   ...            2.0
482   12.852295   13.106773   12.823073   11.559878   ...            3.0
483   12.119938   12.852295   13.106773   12.823073   ...            4.0
484   11.786082   12.119938   12.852295   13.106773   ...            5.0
485   11.590859   11.786082   12.119938   12.852295   ...            6.0
486   12.186487   11.590859   11.786082   12.119938   ...            7.0
487   12.577783   12.186487   11.590859   11.786082   ...            1.0
488   11.816573   12.577783   12.186487   11.590859   ...            2.0
489   11.387627   11.816573   12.577783   12.186487   ...            3.0
490   11.663214   11.387627   11.816573   12.577783   ...            4.0
491   11.504756   11.663214   11.387627   11.816573   ...            5.0
492   12.071173   11.504756   11.663214   11.387627   ...            6.0
493   13.429271   12.071173   11.504756   11.663214   ...            7.0
494   14.191591   13.429271   12.071173   11.504756   ...            1.0
495   13.118295   14.191591   13.429271   12.071173   ...            2.0
496   12.916559   13.118295   14.191591   13.429271   ...            3.0
497   12.496044   12.916559   13.118295   14.191591   ...            4.0
498   12.050954   12.496044   12.916559   13.118295   ...            5.0
499   12.231576   12.050954   12.496044   12.916559   ...            6.0
500   11.791904   12.231576   12.050954   12.496044   ...            7.0
501   11.932721   11.791904   12.231576   12.050954   ...            7.0
502   11.932721   11.932721   11.791904   12.231576   ...            1.0
503   11.982423   11.932721   11.932721   11.791904   ...            2.0
```

```
504   11.266252   11.982423   11.932721   11.932721   ...        3.0
505   11.923226   11.266252   11.982423   11.932721   ...        4.0
506   12.201972   11.923226   11.266252   11.982423   ...        5.0
507   11.731479   12.201972   11.923226   11.266252   ...        6.0
508   11.097177   11.731479   12.201972   11.923226   ...        7.0
..         ...         ...         ...         ...    ...        ...
800   11.300414   11.109560   11.370601   11.430883   ...        5.0
801   11.409880   11.300414   11.109560   11.370601   ...        6.0
802   11.620778   11.409880   11.300414   11.109560   ...        7.0
803   12.729659   11.620778   11.409880   11.300414   ...        1.0
804   11.753871   12.729659   11.620778   11.409880   ...        2.0
805   11.344805   11.753871   12.729659   11.620778   ...        3.0
806   11.800777   11.344805   11.753871   12.729659   ...        4.0
807   11.685169   11.800777   11.344805   11.753871   ...        5.0
808   11.857957   11.685169   11.800777   11.344805   ...        6.0
809   11.710582   11.857957   11.685169   11.800777   ...        7.0
810   12.078164   11.710582   11.857957   11.685169   ...        1.0
811   11.280011   12.078164   11.710582   11.857957   ...        2.0
812   11.095584   11.280011   12.078164   11.710582   ...        3.0
813   11.415105   11.095584   11.280011   12.078164   ...        4.0
814   11.445403   11.415105   11.095584   11.280011   ...        5.0
815   10.972318   11.445403   11.415105   11.095584   ...        6.0
816   11.569300   10.972318   11.445403   11.415105   ...        7.0
817   12.202967   11.569300   10.972318   11.445403   ...        1.0
818   11.264175   12.202967   11.569300   10.972318   ...        2.0
819   11.452649   11.264175   12.202967   11.569300   ...        3.0
820   11.679099   11.452649   11.264175   12.202967   ...        4.0
821   11.285737   11.679099   11.452649   11.264175   ...        5.0
822   11.816914   11.285737   11.679099   11.452649   ...        6.0
823   11.490470   11.816914   11.285737   11.679099   ...        7.0
824   11.582159   11.490470   11.816914   11.285737   ...        1.0
825   10.979566   11.582159   11.490470   11.816914   ...        2.0
826   10.781898   10.979566   11.582159   11.490470   ...        3.0
827   10.674624   10.781898   10.979566   11.582159   ...        4.0
828   10.573835   10.674624   10.781898   10.979566   ...        5.0
829   10.518126   10.573835   10.674624   10.781898   ...        6.0

      weekday(t-6)  weekday(t-7)  weekday(t-8)  weekday(t-9)  weekday(t-10)  \
479            6.0           5.0           4.0           3.0            2.0
480            7.0           6.0           5.0           4.0            3.0
481            1.0           7.0           6.0           5.0            4.0
482            2.0           1.0           7.0           6.0            5.0
483            3.0           2.0           1.0           7.0            6.0
484            4.0           3.0           2.0           1.0            7.0
485            5.0           4.0           3.0           2.0            1.0
486            6.0           5.0           4.0           3.0            2.0
487            7.0           6.0           5.0           4.0            3.0
488            1.0           7.0           6.0           5.0            4.0
```

489	2.0	1.0	7.0	6.0	5.0
490	3.0	2.0	1.0	7.0	6.0
491	4.0	3.0	2.0	1.0	7.0
492	5.0	4.0	3.0	2.0	1.0
493	6.0	5.0	4.0	3.0	2.0
494	7.0	6.0	5.0	4.0	3.0
495	1.0	7.0	6.0	5.0	4.0
496	2.0	1.0	7.0	6.0	5.0
497	3.0	2.0	1.0	7.0	6.0
498	4.0	3.0	2.0	1.0	7.0
499	5.0	4.0	3.0	2.0	1.0
500	6.0	5.0	4.0	3.0	2.0
501	7.0	6.0	5.0	4.0	3.0
502	7.0	7.0	6.0	5.0	4.0
503	1.0	7.0	7.0	6.0	5.0
504	2.0	1.0	7.0	7.0	6.0
505	3.0	2.0	1.0	7.0	7.0
506	4.0	3.0	2.0	1.0	7.0
507	5.0	4.0	3.0	2.0	1.0
508	6.0	5.0	4.0	3.0	2.0
..	...	...	...	...	...
800	4.0	3.0	2.0	1.0	7.0
801	5.0	4.0	3.0	2.0	1.0
802	6.0	5.0	4.0	3.0	2.0
803	7.0	6.0	5.0	4.0	3.0
804	1.0	7.0	6.0	5.0	4.0
805	2.0	1.0	7.0	6.0	5.0
806	3.0	2.0	1.0	7.0	6.0
807	4.0	3.0	2.0	1.0	7.0
808	5.0	4.0	3.0	2.0	1.0
809	6.0	5.0	4.0	3.0	2.0
810	7.0	6.0	5.0	4.0	3.0
811	1.0	7.0	6.0	5.0	4.0
812	2.0	1.0	7.0	6.0	5.0
813	3.0	2.0	1.0	7.0	6.0
814	4.0	3.0	2.0	1.0	7.0
815	5.0	4.0	3.0	2.0	1.0
816	6.0	5.0	4.0	3.0	2.0
817	7.0	6.0	5.0	4.0	3.0
818	1.0	7.0	6.0	5.0	4.0
819	2.0	1.0	7.0	6.0	5.0
820	3.0	2.0	1.0	7.0	6.0
821	4.0	3.0	2.0	1.0	7.0
822	5.0	4.0	3.0	2.0	1.0
823	6.0	5.0	4.0	3.0	2.0
824	7.0	6.0	5.0	4.0	3.0
825	1.0	7.0	6.0	5.0	4.0
826	2.0	1.0	7.0	6.0	5.0

827	3.0	2.0	1.0	7.0	6.0
828	4.0	3.0	2.0	1.0	7.0
829	5.0	4.0	3.0	2.0	1.0

	weekday(t-11)	weekday(t-12)	weekday(t-13)	weekday(t-14)
479	1.0	7.0	6.0	5.0
480	2.0	1.0	7.0	6.0
481	3.0	2.0	1.0	7.0
482	4.0	3.0	2.0	1.0
483	5.0	4.0	3.0	2.0
484	6.0	5.0	4.0	3.0
485	7.0	6.0	5.0	4.0
486	1.0	7.0	6.0	5.0
487	2.0	1.0	7.0	6.0
488	3.0	2.0	1.0	7.0
489	4.0	3.0	2.0	1.0
490	5.0	4.0	3.0	2.0
491	6.0	5.0	4.0	3.0
492	7.0	6.0	5.0	4.0
493	1.0	7.0	6.0	5.0
494	2.0	1.0	7.0	6.0
495	3.0	2.0	1.0	7.0
496	4.0	3.0	2.0	1.0
497	5.0	4.0	3.0	2.0
498	6.0	5.0	4.0	3.0
499	7.0	6.0	5.0	4.0
500	1.0	7.0	6.0	5.0
501	2.0	1.0	7.0	6.0
502	3.0	2.0	1.0	7.0
503	4.0	3.0	2.0	1.0
504	5.0	4.0	3.0	2.0
505	6.0	5.0	4.0	3.0
506	7.0	6.0	5.0	4.0
507	7.0	7.0	6.0	5.0
508	1.0	7.0	7.0	6.0
..	...	...	...	...
800	6.0	5.0	4.0	3.0
801	7.0	6.0	5.0	4.0
802	1.0	7.0	6.0	5.0
803	2.0	1.0	7.0	6.0
804	3.0	2.0	1.0	7.0
805	4.0	3.0	2.0	1.0
806	5.0	4.0	3.0	2.0
807	6.0	5.0	4.0	3.0
808	7.0	6.0	5.0	4.0
809	1.0	7.0	6.0	5.0
810	2.0	1.0	7.0	6.0
811	3.0	2.0	1.0	7.0

```
812          4.0          3.0          2.0          1.0
813          5.0          4.0          3.0          2.0
814          6.0          5.0          4.0          3.0
815          7.0          6.0          5.0          4.0
816          1.0          7.0          6.0          5.0
817          2.0          1.0          7.0          6.0
818          3.0          2.0          1.0          7.0
819          4.0          3.0          2.0          1.0
820          5.0          4.0          3.0          2.0
821          6.0          5.0          4.0          3.0
822          7.0          6.0          5.0          4.0
823          1.0          7.0          6.0          5.0
824          2.0          1.0          7.0          6.0
825          3.0          2.0          1.0          7.0
826          4.0          3.0          2.0          1.0
827          5.0          4.0          3.0          2.0
828          6.0          5.0          4.0          3.0
829          7.0          6.0          5.0          4.0

[351 rows x 85 columns]
```

In [19]: *# Convert predictions back to normal values*

```python
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

```
[[ 11.88620573  11.59085917 115.46893021 ...  43.          37.
   31.        ]
 [ 11.14496101  12.18648691 112.48075791 ...   7.          43.
   37.        ]
 [ 12.4688933   12.57778255 110.7334244  ...  13.           7.
   43.        ]
 ...
 [ 10.71962862  10.2949966  109.74485905 ...  25.          19.
   13.        ]
 [ 10.40230575  10.20294532 100.17673598 ...  31.          25.
   19.        ]
 [ 10.11617149  10.3563499   99.13484299 ...  37.          31.
   25.        ]]
11.886205725987494
11.590859170709699
```

In [20]: *#Fem una llista amb les prediccions i una llista amb y(valor real)*

31

```
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[20]: [11.590859170709699,
 12.186486909458,
 12.5777825527296,
 11.816572589134799,
 11.3876267050719,
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 13.4292708131623,
 14.1915913964734,
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 12.4960441531868,
 12.050954318124699,
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 11.9327208888355,
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 11.923225859637402,
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 11.7314792668086,
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32
```

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```
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        11.480410763265299,
        10.411403084521401,
        10.294996596876901,
        10.202945322371301,
        10.3563498993587]
```

In [21]: ##Mostrem
```python
plt.plot(listpredi, label="predit")
plt.plot(listy, label="real")
plt.legend(loc="lower right")
plt.show()
```
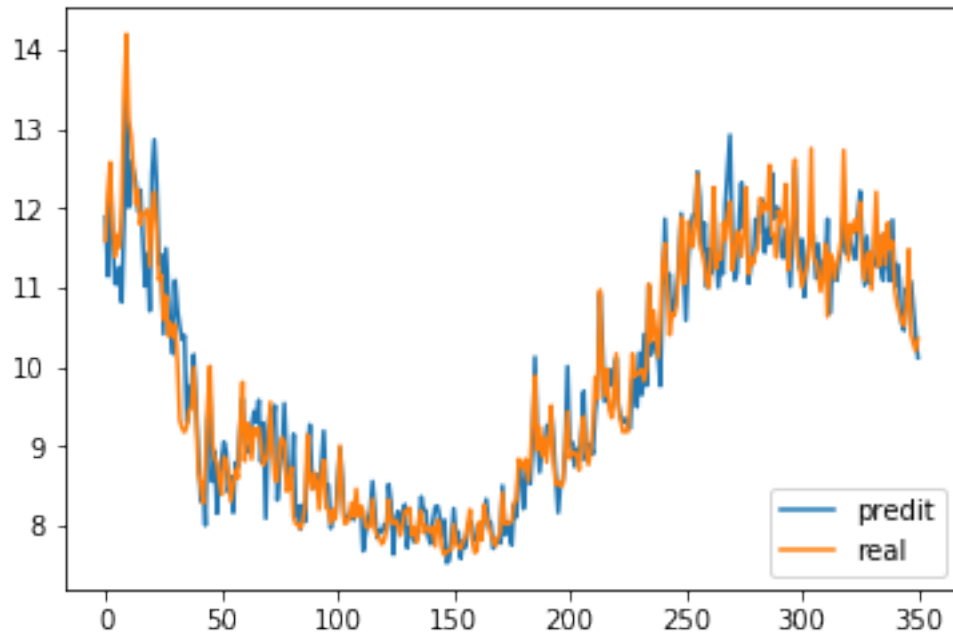
```
In [22]: llista_errors=list()
         llista_errorsabs=list()
         llista_errorsres=list()
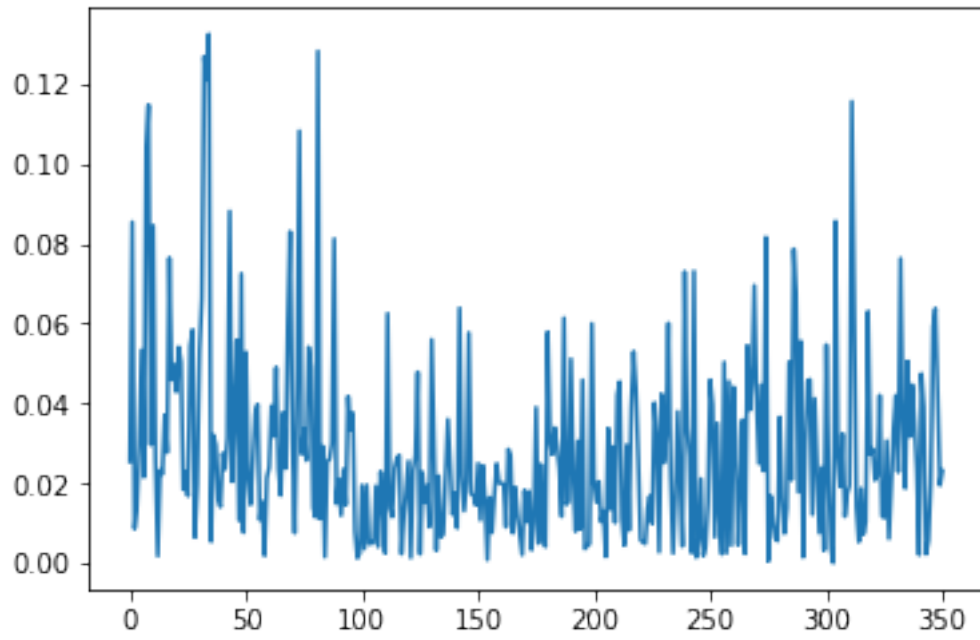

         for i in range(len(listpredi)):
             valor=listy[i]-listpredi[i]
             valorabs=math.fabs(valor)
             valorrespecte=valorabs/listy[i]
             llista_errors.append(valor)
             llista_errorsabs.append(valorabs)
             llista_errorsres.append(valorrespecte)

         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 2.818203815565175 %
```

In [ ]: