M04 _Xarxa_walkforward_normalitzat_multivariate3

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/
        daily.head(5)
```

```
Out[2]:          date  apparentTemperatureMax  sunsetTimeHour  weekday  season  \
        0  2013-01-16                   -0.15              16        3  winter
        1  2013-01-20                   -0.46              16        7  winter
        2  2013-01-10                    2.36              16        4  winter
        3  2013-01-06                    6.98              16        7  winter
        4  2012-01-31                    1.13              16        2  winter

           cloudCover  humidity  visibility  month  energy_sum
        0        0.48      0.91        4.12      1   13.147536
        1        0.85      0.91        5.10      1   15.021900
        2        0.70      0.94        5.21      1   12.066789
```

```
3        0.67      0.96        5.50      1   12.422263
4        0.55      0.84        5.62      1   13.890518
```

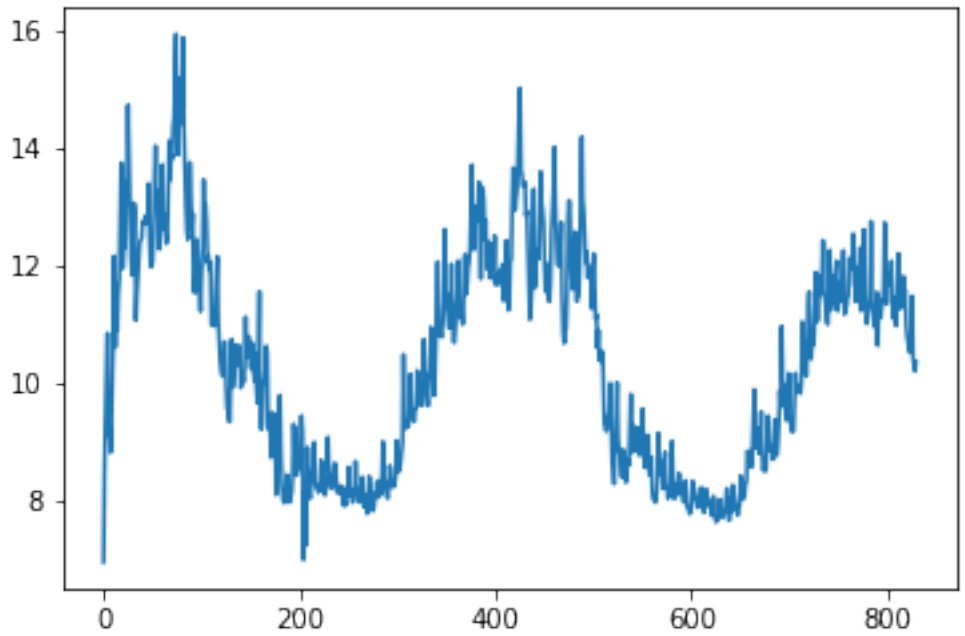
In [4]:
```
#Ens quedem amb date i energy_sum, ordenem valors per data i resetejem index
daily_dia=daily[['date','energy_sum','apparentTemperatureMax','humidity','visibility',
daily_dia.head(5)
```

Out[4]:

	index	date	energy_sum	apparentTemperatureMax	humidity	visibility	cloudCover
0	677	2011-11-23	6.952692	10.36	0.93	8.06	0.36
1	691	2011-11-24	8.536480	12.93	0.89	10.64	0.41
2	713	2011-11-25	9.499781	13.03	0.79	12.38	0.48
3	728	2011-11-26	10.267707	12.96	0.81	13.07	0.44
4	729	2011-11-27	10.850805	13.54	0.72	13.08	0.42

In [16]:
```
plt.plot(daily_dia )
```

Out[16]: [<matplotlib.lines.Line2D at 0x24f9e752240>]



In [5]:
```
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['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['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['visibility(t-1)']=daily_dia['visibility'].shift(1)
daily_dia['visibility(t-2)']=daily_dia['visibility'].shift(2)
daily_dia['visibility(t-3)']=daily_dia['visibility'].shift(3)
daily_dia['visibility(t-4)']=daily_dia['visibility'].shift(4)
daily_dia['visibility(t-5)']=daily_dia['visibility'].shift(5)
daily_dia['visibility(t-6)']=daily_dia['visibility'].shift(6)
daily_dia['visibility(t-7)']=daily_dia['visibility'].shift(7)
#daily_dia['visibility(t-8)']=daily_dia['visibility'].shift(8)

daily_dia['cloudCover(t-1)']=daily_dia['cloudCover'].shift(1)
daily_dia['cloudCover(t-2)']=daily_dia['cloudCover'].shift(2)
daily_dia['cloudCover(t-3)']=daily_dia['cloudCover'].shift(3)
daily_dia['cloudCover(t-4)']=daily_dia['cloudCover'].shift(4)
daily_dia['cloudCover(t-5)']=daily_dia['cloudCover'].shift(5)
daily_dia['cloudCover(t-6)']=daily_dia['cloudCover'].shift(6)
daily_dia['cloudCover(t-7)']=daily_dia['cloudCover'].shift(7)
#daily_dia['cloudCover(t-8)']=daily_dia['cloudCover'].shift(8)



daily_dia
```

Out[5]:

	index	date	energy_sum	apparentTemperatureMax	humidity	\
0	677	2011-11-23	6.952692	10.36	0.93	
1	691	2011-11-24	8.536480	12.93	0.89	
2	713	2011-11-25	9.499781	13.03	0.79	
3	728	2011-11-26	10.267707	12.96	0.81	
4	729	2011-11-27	10.850805	13.54	0.72	
5	704	2011-11-28	9.103382	12.58	0.86	
6	718	2011-11-29	9.274873	13.47	0.82	
7	727	2011-11-30	8.813513	11.87	0.78	
8	778	2011-12-01	9.227707	12.15	0.82	
9	773	2011-12-02	10.145910	5.33	0.87	
10	791	2011-12-03	10.780273	11.42	0.79	
11	822	2011-12-04	12.163127	6.66	0.82	
12	807	2011-12-05	10.609714	3.13	0.77	
13	813	2011-12-06	11.673417	3.77	0.83	
14	810	2011-12-07	10.889362	5.14	0.68	
15	788	2011-12-08	11.525150	12.89	0.81	
16	797	2011-12-09	11.759837	3.99	0.71	
17	799	2011-12-10	12.633801	3.14	0.81	
18	776	2011-12-11	13.749174	5.72	0.88	
19	775	2011-12-12	11.951958	5.94	0.84	
20	786	2011-12-13	11.957446	12.08	0.75	
21	818	2011-12-14	12.392776	2.88	0.79	
22	795	2011-12-15	12.307079	4.38	0.77	
23	763	2011-12-16	13.376080	0.99	0.88	
24	770	2011-12-17	13.511968	1.72	0.86	
25	808	2011-12-18	14.732271	1.98	0.84	
26	757	2011-12-19	13.774471	4.02	0.94	
27	803	2011-12-20	12.709106	4.98	0.81	
28	748	2011-12-21	12.148570	12.14	0.94	
29	806	2011-12-22	11.839403	12.14	0.87	
..	...	...	...	...	...	
800	21	2014-01-29	11.800777	2.53	0.90	
801	10	2014-01-30	11.685169	5.86	0.91	
802	12	2014-01-31	11.857957	5.27	0.91	
803	129	2014-02-01	11.710582	6.86	0.76	
804	155	2014-02-02	12.078164	6.48	0.72	
805	145	2014-02-03	11.280011	4.59	0.79	
806	134	2014-02-04	11.095584	5.63	0.75	
807	123	2014-02-05	11.415105	5.86	0.77	
808	118	2014-02-06	11.445403	7.34	0.82	
809	122	2014-02-07	10.972318	8.44	0.79	
810	126	2014-02-08	11.569300	5.67	0.77	
811	149	2014-02-09	12.202967	3.91	0.66	
812	132	2014-02-10	11.264175	7.07	0.84	
813	143	2014-02-11	11.452649	4.06	0.76	
814	131	2014-02-12	11.679099	4.73	0.75	
815	164	2014-02-13	11.285737	3.42	0.68	

```
816    125  2014-02-14   11.816914                  12.02      0.81
817    141  2014-02-15   11.490470                   5.79      0.69
818    151  2014-02-16   11.582159                   7.88      0.76
819    116  2014-02-17   10.979566                  10.67      0.83
820    128  2014-02-18   10.781898                  10.13      0.87
821    115  2014-02-19   10.674624                  10.13      0.87
822    121  2014-02-20   10.573835                  12.50      0.84
823    174  2014-02-21   10.518126                  10.15      0.72
824    167  2014-02-22   10.776242                  11.63      0.71
825    139  2014-02-23   11.480411                  11.94      0.76
826    162  2014-02-24   10.411403                  14.23      0.74
827    136  2014-02-25   10.294997                  11.43      0.78
828    161  2014-02-26   10.202945                  11.29      0.73
829    133  2014-02-27   10.356350                  10.31      0.74

     visibility  cloudCover        t-1        t-2        t-3  ...  \
0          8.06        0.36        NaN        NaN        NaN  ...
1         10.64        0.41   6.952692        NaN        NaN  ...
2         12.38        0.48   8.536480   6.952692        NaN  ...
3         13.07        0.44   9.499781   8.536480   6.952692  ...
4         13.08        0.42  10.267707   9.499781   8.536480  ...
5         11.84        0.56  10.850805  10.267707   9.499781  ...
6         12.57        0.60   9.103382  10.850805  10.267707  ...
7         13.05        0.31   9.274873   9.103382  10.850805  ...
8         12.15        0.57   8.813513   9.274873   9.103382  ...
9         11.89        0.32   9.227707   8.813513   9.274873  ...
10        12.70        0.54  10.145910   9.227707   8.813513  ...
11        13.36        0.36  10.780273  10.145910   9.227707  ...
12        13.00        0.20  12.163127  10.780273  10.145910  ...
13        13.15        0.34  10.609714  12.163127  10.780273  ...
14        13.12        0.29  11.673417  10.609714  12.163127  ...
15        12.59        0.53  10.889362  11.673417  10.609714  ...
16        12.83        0.15  11.525150  10.889362  11.673417  ...
17        12.83        0.17  11.759837  11.525150  10.889362  ...
18        12.09        0.56  12.633801  11.759837  11.525150  ...
19        12.05        0.38  13.749174  12.633801  11.759837  ...
20        12.55        0.42  11.951958  13.749174  12.633801  ...
21        13.20        0.36  11.957446  11.951958  13.749174  ...
22        12.79        0.42  12.392776  11.957446  11.951958  ...
23        10.96        0.70  12.307079  12.392776  11.957446  ...
24        11.64        0.37  13.376080  12.307079  12.392776  ...
25        13.04        0.22  13.511968  13.376080  12.307079  ...
26        10.43        0.47  14.732271  13.511968  13.376080  ...
27        12.89        0.48  13.774471  14.732271  13.511968  ...
28         9.41        0.67  12.709106  13.774471  14.732271  ...
29        12.99        0.38  12.148570  12.709106  13.774471  ...
..          ...         ...        ...        ...        ...  ...
800        9.53        0.93  11.344805  11.753871  12.729659  ...
```

801	6.63	0.81	11.800777	11.344805	11.753871	...
802	7.08	0.73	11.685169	11.800777	11.344805	...
803	11.60	0.19	11.857957	11.685169	11.800777	...
804	12.89	0.22	11.710582	11.857957	11.685169	...
805	12.50	0.47	12.078164	11.710582	11.857957	...
806	12.05	0.42	11.280011	12.078164	11.710582	...
807	10.91	0.73	11.095584	11.280011	12.078164	...
808	10.53	0.67	11.415105	11.095584	11.280011	...
809	10.85	0.63	11.445403	11.415105	11.095584	...
810	11.20	0.47	10.972318	11.445403	11.415105	...
811	12.71	0.52	11.569300	10.972318	11.445403	...
812	11.81	0.55	12.202967	11.569300	10.972318	...
813	12.39	0.41	11.264175	12.202967	11.569300	...
814	11.80	0.59	11.452649	11.264175	12.202967	...
815	13.04	0.36	11.679099	11.452649	11.264175	...
816	11.17	0.67	11.285737	11.679099	11.452649	...
817	12.38	0.35	11.816914	11.285737	11.679099	...
818	12.78	0.13	11.490470	11.816914	11.285737	...
819	10.32	0.56	11.582159	11.490470	11.816914	...
820	11.49	0.57	10.979566	11.582159	11.490470	...
821	9.95	0.64	10.781898	10.979566	11.582159	...
822	10.61	0.61	10.674624	10.781898	10.979566	...
823	13.31	0.22	10.573835	10.674624	10.781898	...
824	13.07	0.25	10.518126	10.573835	10.674624	...
825	12.33	0.66	10.776242	10.518126	10.573835	...
826	13.00	0.50	11.480411	10.776242	10.518126	...
827	12.09	0.62	10.411403	11.480411	10.776242	...
828	13.00	0.26	10.294997	10.411403	11.480411	...
829	12.04	0.32	10.202945	10.294997	10.411403	...

	visibility(t-7)	visibility(t-8)	cloudCover(t-1)	cloudCover(t-2)	\
0	NaN	NaN	NaN	NaN	
1	NaN	NaN	0.36	NaN	
2	NaN	NaN	0.41	0.36	
3	NaN	NaN	0.48	0.41	
4	NaN	NaN	0.44	0.48	
5	NaN	NaN	0.42	0.44	
6	NaN	NaN	0.56	0.42	
7	8.06	NaN	0.60	0.56	
8	10.64	8.06	0.31	0.60	
9	12.38	10.64	0.57	0.31	
10	13.07	12.38	0.32	0.57	
11	13.08	13.07	0.54	0.32	
12	11.84	13.08	0.36	0.54	
13	12.57	11.84	0.20	0.36	
14	13.05	12.57	0.34	0.20	
15	12.15	13.05	0.29	0.34	
16	11.89	12.15	0.53	0.29	

17	12.70	11.89	0.15	0.53
18	13.36	12.70	0.17	0.15
19	13.00	13.36	0.56	0.17
20	13.15	13.00	0.38	0.56
21	13.12	13.15	0.42	0.38
22	12.59	13.12	0.36	0.42
23	12.83	12.59	0.42	0.36
24	12.83	12.83	0.70	0.42
25	12.09	12.83	0.37	0.70
26	12.05	12.09	0.22	0.37
27	12.55	12.05	0.47	0.22
28	13.20	12.55	0.48	0.47
29	12.79	13.20	0.67	0.48
..	...	...	...	...
800	10.20	6.36	0.61	0.38
801	11.49	10.20	0.93	0.61
802	11.99	11.49	0.81	0.93
803	8.71	11.99	0.73	0.81
804	11.97	8.71	0.19	0.73
805	12.68	11.97	0.22	0.19
806	11.94	12.68	0.47	0.22
807	9.53	11.94	0.42	0.47
808	6.63	9.53	0.73	0.42
809	7.08	6.63	0.67	0.73
810	11.60	7.08	0.63	0.67
811	12.89	11.60	0.47	0.63
812	12.50	12.89	0.52	0.47
813	12.05	12.50	0.55	0.52
814	10.91	12.05	0.41	0.55
815	10.53	10.91	0.59	0.41
816	10.85	10.53	0.36	0.59
817	11.20	10.85	0.67	0.36
818	12.71	11.20	0.35	0.67
819	11.81	12.71	0.13	0.35
820	12.39	11.81	0.56	0.13
821	11.80	12.39	0.57	0.56
822	13.04	11.80	0.64	0.57
823	11.17	13.04	0.61	0.64
824	12.38	11.17	0.22	0.61
825	12.78	12.38	0.25	0.22
826	10.32	12.78	0.66	0.25
827	11.49	10.32	0.50	0.66
828	9.95	11.49	0.62	0.50
829	10.61	9.95	0.26	0.62

	cloudCover(t-3)	cloudCover(t-4)	cloudCover(t-5)	cloudCover(t-6)	\
0	NaN	NaN	NaN	NaN	
1	NaN	NaN	NaN	NaN	

2	NaN	NaN	NaN	NaN
3	0.36	NaN	NaN	NaN
4	0.41	0.36	NaN	NaN
5	0.48	0.41	0.36	NaN
6	0.44	0.48	0.41	0.36
7	0.42	0.44	0.48	0.41
8	0.56	0.42	0.44	0.48
9	0.60	0.56	0.42	0.44
10	0.31	0.60	0.56	0.42
11	0.57	0.31	0.60	0.56
12	0.32	0.57	0.31	0.60
13	0.54	0.32	0.57	0.31
14	0.36	0.54	0.32	0.57
15	0.20	0.36	0.54	0.32
16	0.34	0.20	0.36	0.54
17	0.29	0.34	0.20	0.36
18	0.53	0.29	0.34	0.20
19	0.15	0.53	0.29	0.34
20	0.17	0.15	0.53	0.29
21	0.56	0.17	0.15	0.53
22	0.38	0.56	0.17	0.15
23	0.42	0.38	0.56	0.17
24	0.36	0.42	0.38	0.56
25	0.42	0.36	0.42	0.38
26	0.70	0.42	0.36	0.42
27	0.37	0.70	0.42	0.36
28	0.22	0.37	0.70	0.42
29	0.47	0.22	0.37	0.70
..	...	...	...	...
800	0.40	0.44	0.54	0.32
801	0.38	0.40	0.44	0.54
802	0.61	0.38	0.40	0.44
803	0.93	0.61	0.38	0.40
804	0.81	0.93	0.61	0.38
805	0.73	0.81	0.93	0.61
806	0.19	0.73	0.81	0.93
807	0.22	0.19	0.73	0.81
808	0.47	0.22	0.19	0.73
809	0.42	0.47	0.22	0.19
810	0.73	0.42	0.47	0.22
811	0.67	0.73	0.42	0.47
812	0.63	0.67	0.73	0.42
813	0.47	0.63	0.67	0.73
814	0.52	0.47	0.63	0.67
815	0.55	0.52	0.47	0.63
816	0.41	0.55	0.52	0.47
817	0.59	0.41	0.55	0.52
818	0.36	0.59	0.41	0.55

819	0.67	0.36	0.59	0.41
820	0.35	0.67	0.36	0.59
821	0.13	0.35	0.67	0.36
822	0.56	0.13	0.35	0.67
823	0.57	0.56	0.13	0.35
824	0.64	0.57	0.56	0.13
825	0.61	0.64	0.57	0.56
826	0.22	0.61	0.64	0.57
827	0.25	0.22	0.61	0.64
828	0.66	0.25	0.22	0.61
829	0.50	0.66	0.25	0.22

	cloudCover(t-7)	cloudCover(t-8)
0	NaN	NaN
1	NaN	NaN
2	NaN	NaN
3	NaN	NaN
4	NaN	NaN
5	NaN	NaN
6	NaN	NaN
7	0.36	NaN
8	0.41	0.36
9	0.48	0.41
10	0.44	0.48
11	0.42	0.44
12	0.56	0.42
13	0.60	0.56
14	0.31	0.60
15	0.57	0.31
16	0.32	0.57
17	0.54	0.32
18	0.36	0.54
19	0.20	0.36
20	0.34	0.20
21	0.29	0.34
22	0.53	0.29
23	0.15	0.53
24	0.17	0.15
25	0.56	0.17
26	0.38	0.56
27	0.42	0.38
28	0.36	0.42
29	0.42	0.36
..	...	...
800	0.69	0.37
801	0.32	0.69
802	0.54	0.32
803	0.44	0.54

```
804             0.40             0.44
805             0.38             0.40
806             0.61             0.38
807             0.93             0.61
808             0.81             0.93
809             0.73             0.81
810             0.19             0.73
811             0.22             0.19
812             0.47             0.22
813             0.42             0.47
814             0.73             0.42
815             0.67             0.73
816             0.63             0.67
817             0.47             0.63
818             0.52             0.47
819             0.55             0.52
820             0.41             0.55
821             0.59             0.41
822             0.36             0.59
823             0.67             0.36
824             0.35             0.67
825             0.13             0.35
826             0.56             0.13
827             0.57             0.56
828             0.64             0.57
829             0.61             0.64

[830 rows x 47 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', 'humidity', 'visibil
#daily_dia=daily_dia[['energy_sum','t-1','t-2','t-3','t-4','t-5','t-6','t-7','t-8','te
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

   temp(t-1)  ...  visibility(t-7)  visibility(t-8)  cloudCover(t-1)  \
0        NaN  ...              NaN              NaN              NaN
1      10.36  ...              NaN              NaN             0.36
2      12.93  ...              NaN              NaN             0.41
3      13.03  ...              NaN              NaN             0.48
4      12.96  ...              NaN              NaN             0.44
```

```
   cloudCover(t-2)  cloudCover(t-3)  cloudCover(t-4)  cloudCover(t-5)  \
0              NaN              NaN              NaN              NaN
1              NaN              NaN              NaN              NaN
2             0.36              NaN              NaN              NaN
3             0.41             0.36              NaN              NaN
4             0.48             0.41             0.36              NaN

   cloudCover(t-6)  cloudCover(t-7)  cloudCover(t-8)
0              NaN              NaN              NaN
1              NaN              NaN              NaN
2              NaN              NaN              NaN
3              NaN              NaN              NaN
4              NaN              NaN              NaN

[5 rows x 41 columns]
```

In [7]:
```
#Eliminem les 8 primeres files ja que contenen NaN (valors buits)

daily_dia=daily_dia.drop([0,1,2,3,4,5,6])
daily_dia.head(5)
```

Out[7]:
```
    energy_sum        t-1        t-2        t-3        t-4        t-5  \
8     9.227707   8.813513   9.274873   9.103382  10.850805  10.267707
9    10.145910   9.227707   8.813513   9.274873   9.103382  10.850805
10   10.780273  10.145910   9.227707   8.813513   9.274873   9.103382
11   12.163127  10.780273  10.145910   9.227707   8.813513   9.274873
12   10.609714  12.163127  10.780273  10.145910   9.227707   8.813513

          t-6        t-7        t-8  temp(t-1)  ...  visibility(t-7)  \
8    9.499781   8.536480   6.952692      11.87  ...            10.64
9   10.267707   9.499781   8.536480      12.15  ...            12.38
10  10.850805  10.267707   9.499781       5.33  ...            13.07
11   9.103382  10.850805  10.267707      11.42  ...            13.08
12   9.274873   9.103382  10.850805       6.66  ...            11.84

    visibility(t-8)  cloudCover(t-1)  cloudCover(t-2)  cloudCover(t-3)  \
8              8.06             0.31             0.60             0.56
9             10.64             0.57             0.31             0.60
10            12.38             0.32             0.57             0.31
11            13.07             0.54             0.32             0.57
12            13.08             0.36             0.54             0.32

    cloudCover(t-4)  cloudCover(t-5)  cloudCover(t-6)  cloudCover(t-7)  \
8              0.42             0.44             0.48             0.41
9              0.56             0.42             0.44             0.48
10             0.60             0.56             0.42             0.44
11             0.31             0.60             0.56             0.42
```

```
        12              0.57              0.31              0.60              0.56

            cloudCover(t-8)
        8               0.36
        9               0.41
        10              0.48
        11              0.44
        12              0.42

        [5 rows x 41 columns]
```

```
In [8]: len(daily_dia)
```

```
Out[8]: 822
```

```
In [9]: #normalitzem
        scaler=preprocessing.MinMaxScaler(feature_range=(0, 1))
        daily_dia_norm=scaler.fit_transform(daily_dia)
```

```
In [47]:
```

```
Out[47]: array([0.25530572, 0.2361457 , 0.43137821, 0.36623108, 0.28043381,
                0.17280805, 0.        , 0.48124829, 0.45688475, 0.48316452,
                0.46728716, 0.46920339, 0.46646592, 0.39611278])
```

```
In [10]: #Seleccionem dades per test i train
         y_daily=daily_dia_norm[:,0]
         X_daily=daily_dia_norm[:,1:41]

         #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], 7,5))
```

```
In [11]: # definim model
         import tensorflow as tf
         model =Sequential()
         model.add(LSTM(50, activation='relu', input_shape=(7, 5)))
         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 [12]:
```
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.
```

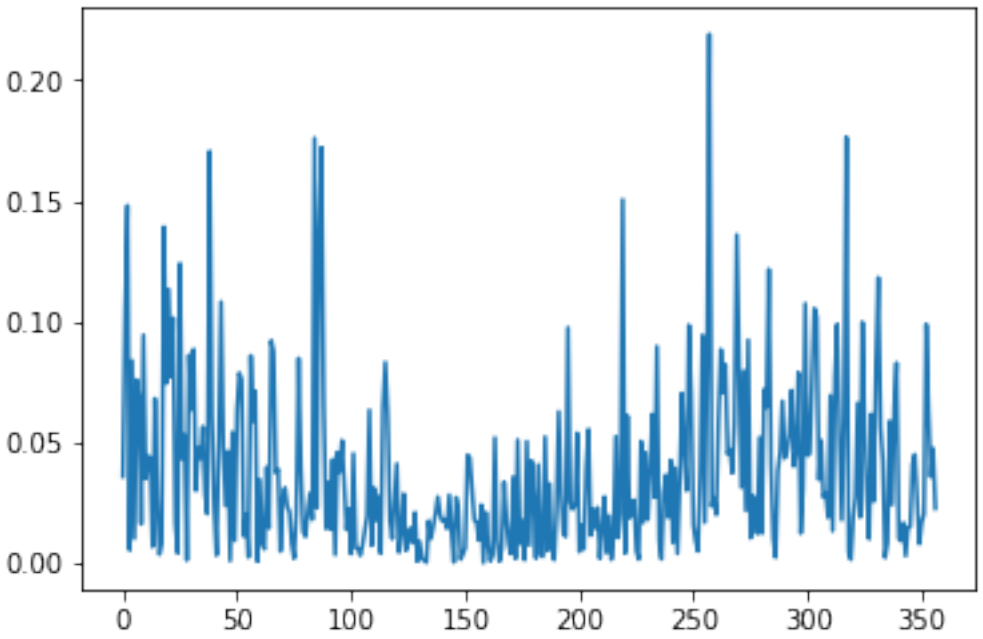
In [13]:
```
#Dividim la suma de scores de test entre el nombre de prediccions per obtenir la mitj
```

```
sumScores/(lenght-n_train)
```

Out[13]: 0.0378374619251307

In [32]:
```
plt.plot(llista_scores)
```

Out[32]: [<matplotlib.lines.Line2D at 0x1a4e67f7550>]



In [14]:
```
predis=list()

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

predis=np.reshape(predis, (357)  )

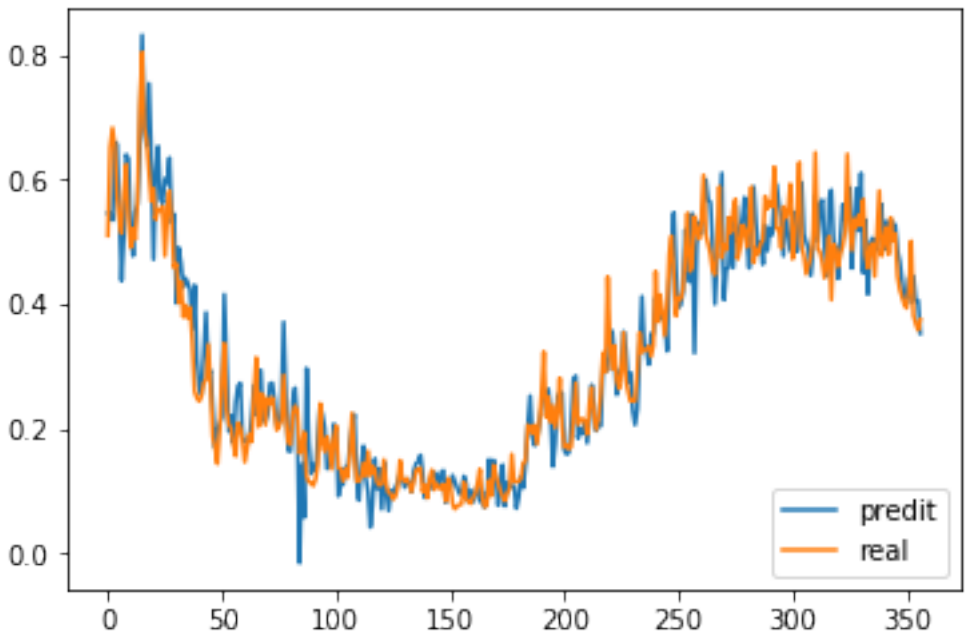
predis
```

Out[14]:
```
array([ 0.5464527 ,  0.54699141,  0.53532583,  0.66038722,  0.65703321,
        0.54603016,  0.43810403,  0.51232904,  0.64046395,  0.63374388,
        0.52624446,  0.47787774,  0.54813969,  0.56101316,  0.65131396,
        0.83231431,  0.68111956,  0.65423614,  0.75445998,  0.63992995,
        0.4721874 ,  0.61358851,  0.65382218,  0.56863159,  0.56197119,
        0.60192895,  0.59430456,  0.63533115,  0.53094035,  0.54509109,
        0.40219116,  0.49120271,  0.46691379,  0.42764202,  0.44223842,
        0.43441406,  0.4241851 ,  0.36166599,  0.43095088,  0.31274277,
```

```
0.26807156,  0.25578961,  0.32320654,  0.38708672,  0.28680271,
0.29431087,  0.23354691,  0.17033494,  0.19861355,  0.20913205,
0.21995112,  0.41619116,  0.30773705,  0.19609454,  0.22134268,
0.17755648,  0.24261813,  0.26878494,  0.27367911,  0.18427184,
0.18172058,  0.17705388,  0.18550727,  0.21962725,  0.26989967,
0.22276036,  0.29141295,  0.29441515,  0.21430415,  0.21142785,
0.22339293,  0.27266827,  0.27405331,  0.24799444,  0.2061756 ,
0.20697217,  0.23500861,  0.37173009,  0.25462505,  0.16518483,
0.16413151,  0.24564457,  0.26603937,  0.21219869, -0.01482182,
0.14322308,  0.05825324,  0.29765648,  0.18096064,  0.12855792,
0.14253241,  0.13344164,  0.18596967,  0.2375775 ,  0.22311224,
0.20192672,  0.13655107,  0.14160112,  0.14948629,  0.20828275,
0.20133394,  0.0925907 ,  0.12960723,  0.11048547,  0.1383597 ,
0.12953927,  0.17297119,  0.20589547,  0.22318496,  0.12315314,
0.08581354,  0.14203522,  0.1729719 ,  0.12099048,  0.09979576,
0.0426039 ,  0.07929224,  0.15248828,  0.10446157,  0.1360454 ,
0.07148495,  0.14644946,  0.0970054 ,  0.06905612,  0.10098136,
0.09762684,  0.10681014,  0.11479604,  0.12874678,  0.12103106,
0.10651781,  0.11911786,  0.1140017 ,  0.09941755,  0.13187744,
0.14466417,  0.14807831,  0.15818702,  0.12686606,  0.0897795 ,
0.1068566 ,  0.10282313,  0.12003123,  0.13077451,  0.12559947,
0.10872255,  0.13035955,  0.1334939 ,  0.08234674,  0.11730404,
0.10666703,  0.12563267,  0.11545055,  0.10566247,  0.09638156,
0.0965794 ,  0.12435766,  0.11269754,  0.08350056,  0.10156332,
0.08296392,  0.09591876,  0.11044947,  0.08361138,  0.10062972,
0.07423539,  0.08306994,  0.15133497,  0.1111124 ,  0.15021679,
0.12217034,  0.07741794,  0.10233065,  0.1427111 ,  0.07669228,
0.11426815,  0.10572388,  0.10934503,  0.10836442,  0.07283241,
0.09075444,  0.12282422,  0.10581918,  0.14439671,  0.20400149,
0.25332153,  0.18806532,  0.17370677,  0.18265158,  0.20688862,
0.2343263 ,  0.26127708,  0.24753764,  0.2640537 ,  0.22204109,
0.14011467,  0.17698225,  0.25200751,  0.25793815,  0.25815585,
0.16602023,  0.15957859,  0.16219741,  0.21090648,  0.27963871,
0.28530094,  0.18517904,  0.20105025,  0.19372779,  0.21316829,
0.1777456 ,  0.21409249,  0.27097332,  0.23852468,  0.19731778,
0.20687114,  0.20508707,  0.31171447,  0.31193483,  0.29382604,
0.34378719,  0.35741484,  0.31464183,  0.2552439 ,  0.29099065,
0.29912332,  0.35643861,  0.32786322,  0.27612734,  0.29021126,
0.2290999 ,  0.20694423,  0.23174725,  0.32774091,  0.41283172,
0.3355512 ,  0.32681739,  0.30377722,  0.3529107 ,  0.35270351,
0.41039073,  0.38065952,  0.37627369,  0.385831  ,  0.38394618,
0.32526785,  0.43637058,  0.47993606,  0.54751861,  0.45158869,
0.39538378,  0.39926535,  0.41938615,  0.5197562 ,  0.45222175,
0.43612218,  0.54611421,  0.32211846,  0.49538374,  0.53211719,
0.51416725,  0.5481894 ,  0.59994644,  0.56829822,  0.56371307,
0.49911088,  0.40067178,  0.46996629,  0.53079772,  0.61075717,
0.40752915,  0.45655704,  0.45947242,  0.53735393,  0.45887887,
0.55840218,  0.50098133,  0.5128231 ,  0.53928715,  0.57176387,
```

```
0.50409782,  0.45833284,  0.52402925,  0.58875966,  0.53040802,
0.49175778,  0.50006771,  0.46441865,  0.52758336,  0.48616835,
0.52147746,  0.51143038,  0.56667107,  0.59284925,  0.56208646,
0.53749454,  0.47788867,  0.5512827 ,  0.51934105,  0.48607832,
0.51754671,  0.54809946,  0.48498785,  0.52262288,  0.59564388,
0.51255161,  0.49956167,  0.48866111,  0.44641373,  0.48944774,
0.57439458,  0.50211859,  0.56234932,  0.56757718,  0.49370363,
0.44566563,  0.56990552,  0.58371419,  0.50078273,  0.49094099,
0.44142675,  0.50895464,  0.56010127,  0.53636014,  0.54149616,
0.58742672,  0.45831478,  0.52753872,  0.58626711,  0.51835769,
0.61077118,  0.45023164,  0.53569257,  0.41649833,  0.49665669,
0.50628316,  0.50377268,  0.48749882,  0.51717144,  0.56047642,
0.48846763,  0.53315151,  0.49666613,  0.53632152,  0.51772523,
0.528198  ,  0.48664916,  0.46865171,  0.4379375 ,  0.40840709,
0.41099474,  0.44326037,  0.40285838,  0.44536072,  0.40502924,
0.40650463,  0.3535111 ])
```

In [15]:
```
##Mostrem
plt.plot(predis, label="predit")
plt.plot(y_daily[n_train:lenght], label="real")
plt.legend(loc="lower right")
plt.show()
```



In [ ]:

In [26]:
```
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','temp(t-1)','temp(
        prova
```

```
c:\users\laura\appdata\local\programs\python\python37\lib\site-packages\ipykernel_launcher.py:5
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
  """
c:\users\laura\appdata\local\programs\python\python37\lib\site-packages\ipykernel_launcher.py:6
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
```

Out[26]:

	predi	y	t-2	t-3	t-4	t-5	\
473	0.546453	0.510600	10.889469	10.675248	10.860481	11.481859	
474	0.546991	0.651732	10.930170	10.889469	10.675248	10.860481	
475	0.535326	0.683428	11.559878	10.930170	10.889469	10.675248	
476	0.660387	0.654997	12.823073	11.559878	10.930170	10.889469	
477	0.657033	0.573173	13.106773	12.823073	11.559878	10.930170	
478	0.546030	0.535873	12.852295	13.106773	12.823073	11.559878	
479	0.438104	0.514061	12.119938	12.852295	13.106773	12.823073	
480	0.512329	0.580609	11.786082	12.119938	12.852295	13.106773	
481	0.640464	0.624326	11.590859	11.786082	12.119938	12.852295	
482	0.633744	0.539280	12.186487	11.590859	11.786082	12.119938	
483	0.526244	0.491355	12.577783	12.186487	11.590859	11.786082	
484	0.477878	0.522145	11.816573	12.577783	12.186487	11.590859	
485	0.548140	0.504442	11.387627	11.816573	12.577783	12.186487	
486	0.561013	0.567725	11.663214	11.387627	11.816573	12.577783	
487	0.651314	0.719460	11.504756	11.663214	11.387627	11.816573	
488	0.832314	0.804631	12.071173	11.504756	11.663214	11.387627	
489	0.681120	0.684716	13.429271	12.071173	11.504756	11.663214	
490	0.654236	0.662177	14.191591	13.429271	12.071173	11.504756	
491	0.754460	0.615194	13.118295	14.191591	13.429271	12.071173	
492	0.639930	0.565466	12.916559	13.118295	14.191591	13.429271	
493	0.472187	0.585646	12.496044	12.916559	13.118295	14.191591	
494	0.613589	0.536523	12.050954	12.496044	12.916559	13.118295	
495	0.653822	0.552256	12.231576	12.050954	12.496044	12.916559	

```
496  0.568632  0.552256  11.791904  12.231576  12.050954  12.496044
497  0.561971  0.557809  11.932721  11.791904  12.231576  12.050954
498  0.601929  0.477794  11.932721  11.932721  11.791904  12.231576
499  0.594305  0.551195  11.982423  11.932721  11.932721  11.791904
500  0.635331  0.582339  11.266252  11.982423  11.932721  11.932721
501  0.530940  0.529772  11.923226  11.266252  11.982423  11.932721
502  0.545091  0.458904  12.201972  11.923226  11.266252  11.982423
..        ...       ...        ...        ...        ...        ...
800  0.527539  0.537515  11.753871  12.729659  11.620778  11.409880
801  0.586267  0.524598  11.344805  11.753871  12.729659  11.620778
802  0.518358  0.543903  11.800777  11.344805  11.753871  12.729659
803  0.610771  0.527438  11.685169  11.800777  11.344805  11.753871
804  0.450232  0.568506  11.857957  11.685169  11.800777  11.344805
805  0.535693  0.479332  11.710582  11.857957  11.685169  11.800777
806  0.416498  0.458726  12.078164  11.710582  11.857957  11.685169
807  0.496657  0.494425  11.280011  12.078164  11.710582  11.857957
808  0.506283  0.497810  11.095584  11.280011  12.078164  11.710582
809  0.503773  0.444954  11.415105  11.095584  11.280011  12.078164
810  0.487499  0.511653  11.445403  11.415105  11.095584  11.280011
811  0.517171  0.582450  10.972318  11.445403  11.415105  11.095584
812  0.560476  0.477562  11.569300  10.972318  11.445403  11.415105
813  0.488468  0.498620  12.202967  11.569300  10.972318  11.445403
814  0.533152  0.523920  11.264175  12.202967  11.569300  10.972318
815  0.496666  0.479971  11.452649  11.264175  12.202967  11.569300
816  0.536322  0.539318  11.679099  11.452649  11.264175  12.202967
817  0.517725  0.502845  11.285737  11.679099  11.452649  11.264175
818  0.528198  0.513089  11.816914  11.285737  11.679099  11.452649
819  0.486649  0.445764  11.490470  11.816914  11.285737  11.679099
820  0.468652  0.423680  11.582159  11.490470  11.816914  11.285737
821  0.437937  0.411694  10.979566  11.582159  11.490470  11.816914
822  0.408407  0.400434  10.781898  10.979566  11.582159  11.490470
823  0.410995  0.394209  10.674624  10.781898  10.979566  11.582159
824  0.443260  0.423048  10.573835  10.674624  10.781898  10.979566
825  0.402858  0.501722  10.518126  10.573835  10.674624  10.781898
826  0.445361  0.382286  10.776242  10.518126  10.573835  10.674624
827  0.405029  0.369280  11.480411  10.776242  10.518126  10.573835
828  0.406505  0.358995  10.411403  11.480411  10.776242  10.518126
829  0.353511  0.376135  10.294997  10.411403  11.480411  10.776242

           t-6        t-7        t-8  temp(t-1)  ...  visibility(t-7)  \
473  12.735907  12.308851  12.048499       9.04  ...            13.05
474  11.481859  12.735907  12.308851       7.53  ...            10.12
475  10.860481  11.481859  12.735907       0.33  ...             7.02
476  10.675248  10.860481  11.481859      -4.11  ...             8.11
477  10.889469  10.675248  10.860481      -0.56  ...             8.37
478  10.930170  10.889469  10.675248       3.01  ...             2.78
479  11.559878  10.930170  10.889469       5.17  ...             1.93
480  12.823073  11.559878  10.930170       4.56  ...             5.68
```

481	13.106773	12.823073	11.559878	3.91	...	12.26
482	12.852295	13.106773	12.823073	5.13	...	10.83
483	12.119938	12.852295	13.106773	7.06	...	12.34
484	11.786082	12.119938	12.852295	5.81	...	13.04
485	11.590859	11.786082	12.119938	3.49	...	10.54
486	12.186487	11.590859	11.786082	2.57	...	12.36
487	12.577783	12.186487	11.590859	0.07	...	12.13
488	11.816573	12.577783	12.186487	-2.27	...	11.52
489	11.387627	11.816573	12.577783	-2.86	...	7.97
490	11.663214	11.387627	11.816573	-2.89	...	8.32
491	11.504756	11.663214	11.387627	-2.29	...	5.73
492	12.071173	11.504756	11.663214	-0.19	...	10.80
493	13.429271	12.071173	11.504756	0.31	...	6.10
494	14.191591	13.429271	12.071173	1.71	...	3.73
495	13.118295	14.191591	13.429271	1.53	...	9.37
496	12.916559	13.118295	14.191591	1.29	...	12.76
497	12.496044	12.916559	13.118295	1.64	...	12.81
498	12.050954	12.496044	12.916559	3.74	...	12.86
499	12.231576	12.050954	12.496044	-0.57	...	11.64
500	11.791904	12.231576	12.050954	-1.57	...	13.45
501	11.932721	11.791904	12.231576	3.68	...	13.10
502	11.932721	11.932721	11.791904	8.53	...	12.68
..	...	...	...	...	...	...
800	11.300414	11.109560	11.370601	6.34	...	10.20
801	11.409880	11.300414	11.109560	2.53	...	11.49
802	11.620778	11.409880	11.300414	5.86	...	11.99
803	12.729659	11.620778	11.409880	5.27	...	8.71
804	11.753871	12.729659	11.620778	6.86	...	11.97
805	11.344805	11.753871	12.729659	6.48	...	12.68
806	11.800777	11.344805	11.753871	4.59	...	11.94
807	11.685169	11.800777	11.344805	5.63	...	9.53
808	11.857957	11.685169	11.800777	5.86	...	6.63
809	11.710582	11.857957	11.685169	7.34	...	7.08
810	12.078164	11.710582	11.857957	8.44	...	11.60
811	11.280011	12.078164	11.710582	5.67	...	12.89
812	11.095584	11.280011	12.078164	3.91	...	12.50
813	11.415105	11.095584	11.280011	7.07	...	12.05
814	11.445403	11.415105	11.095584	4.06	...	10.91
815	10.972318	11.445403	11.415105	4.73	...	10.53
816	11.569300	10.972318	11.445403	3.42	...	10.85
817	12.202967	11.569300	10.972318	12.02	...	11.20
818	11.264175	12.202967	11.569300	5.79	...	12.71
819	11.452649	11.264175	12.202967	7.88	...	11.81
820	11.679099	11.452649	11.264175	10.67	...	12.39
821	11.285737	11.679099	11.452649	10.13	...	11.80
822	11.816914	11.285737	11.679099	10.13	...	13.04
823	11.490470	11.816914	11.285737	12.50	...	11.17
824	11.582159	11.490470	11.816914	10.15	...	12.38

```
825  10.979566  11.582159  11.490470      11.63  ...            12.78
826  10.781898  10.979566  11.582159      11.94  ...            10.32
827  10.674624  10.781898  10.979566      14.23  ...            11.49
828  10.573835  10.674624  10.781898      11.43  ...             9.95
829  10.518126  10.573835  10.674624      11.29  ...            10.61

     visibility(t-8)  cloudCover(t-1)  cloudCover(t-2)  cloudCover(t-3)  \
473            10.27             0.83             0.68             0.17
474            13.05             0.84             0.83             0.68
475            10.12             0.81             0.84             0.83
476             7.02             0.60             0.81             0.84
477             8.11             0.54             0.60             0.81
478             8.37             0.37             0.54             0.60
479             2.78             0.27             0.37             0.54
480             1.93             0.65             0.27             0.37
481             5.68             0.69             0.65             0.27
482            12.26             0.64             0.69             0.65
483            10.83             0.50             0.64             0.69
484            12.34             0.59             0.50             0.64
485            13.04             0.78             0.59             0.50
486            10.54             0.61             0.78             0.59
487            12.36             0.69             0.61             0.78
488            12.13             0.85             0.69             0.61
489            11.52             0.83             0.85             0.69
490             7.97             0.68             0.83             0.85
491             8.32             0.69             0.68             0.83
492             5.73             0.48             0.69             0.68
493            10.80             0.50             0.48             0.69
494             6.10             0.59             0.50             0.48
495             3.73             0.66             0.59             0.50
496             9.37             0.57             0.66             0.59
497            12.76             0.40             0.57             0.66
498            12.81             0.20             0.40             0.57
499            12.86             0.45             0.20             0.40
500            11.64             0.55             0.45             0.20
501            13.45             0.63             0.55             0.45
502            13.10             0.23             0.63             0.55
..               ...              ...              ...              ...
800             6.36             0.61             0.38             0.40
801            10.20             0.93             0.61             0.38
802            11.49             0.81             0.93             0.61
803            11.99             0.73             0.81             0.93
804             8.71             0.19             0.73             0.81
805            11.97             0.22             0.19             0.73
806            12.68             0.47             0.22             0.19
807            11.94             0.42             0.47             0.22
808             9.53             0.73             0.42             0.47
809             6.63             0.67             0.73             0.42
```

810	7.08	0.63	0.67	0.73
811	11.60	0.47	0.63	0.67
812	12.89	0.52	0.47	0.63
813	12.50	0.55	0.52	0.47
814	12.05	0.41	0.55	0.52
815	10.91	0.59	0.41	0.55
816	10.53	0.36	0.59	0.41
817	10.85	0.67	0.36	0.59
818	11.20	0.35	0.67	0.36
819	12.71	0.13	0.35	0.67
820	11.81	0.56	0.13	0.35
821	12.39	0.57	0.56	0.13
822	11.80	0.64	0.57	0.56
823	13.04	0.61	0.64	0.57
824	11.17	0.22	0.61	0.64
825	12.38	0.25	0.22	0.61
826	12.78	0.66	0.25	0.22
827	10.32	0.50	0.66	0.25
828	11.49	0.62	0.50	0.66
829	9.95	0.26	0.62	0.50

	cloudCover(t-4)	cloudCover(t-5)	cloudCover(t-6)	cloudCover(t-7)	\
473	0.12	0.27	0.58	0.66	
474	0.17	0.12	0.27	0.58	
475	0.68	0.17	0.12	0.27	
476	0.83	0.68	0.17	0.12	
477	0.84	0.83	0.68	0.17	
478	0.81	0.84	0.83	0.68	
479	0.60	0.81	0.84	0.83	
480	0.54	0.60	0.81	0.84	
481	0.37	0.54	0.60	0.81	
482	0.27	0.37	0.54	0.60	
483	0.65	0.27	0.37	0.54	
484	0.69	0.65	0.27	0.37	
485	0.64	0.69	0.65	0.27	
486	0.50	0.64	0.69	0.65	
487	0.59	0.50	0.64	0.69	
488	0.78	0.59	0.50	0.64	
489	0.61	0.78	0.59	0.50	
490	0.69	0.61	0.78	0.59	
491	0.85	0.69	0.61	0.78	
492	0.83	0.85	0.69	0.61	
493	0.68	0.83	0.85	0.69	
494	0.69	0.68	0.83	0.85	
495	0.48	0.69	0.68	0.83	
496	0.50	0.48	0.69	0.68	
497	0.59	0.50	0.48	0.69	
498	0.66	0.59	0.50	0.48	

499	0.57	0.66	0.59	0.50
500	0.40	0.57	0.66	0.59
501	0.20	0.40	0.57	0.66
502	0.45	0.20	0.40	0.57
..	...	...	...	...
800	0.44	0.54	0.32	0.69
801	0.40	0.44	0.54	0.32
802	0.38	0.40	0.44	0.54
803	0.61	0.38	0.40	0.44
804	0.93	0.61	0.38	0.40
805	0.81	0.93	0.61	0.38
806	0.73	0.81	0.93	0.61
807	0.19	0.73	0.81	0.93
808	0.22	0.19	0.73	0.81
809	0.47	0.22	0.19	0.73
810	0.42	0.47	0.22	0.19
811	0.73	0.42	0.47	0.22
812	0.67	0.73	0.42	0.47
813	0.63	0.67	0.73	0.42
814	0.47	0.63	0.67	0.73
815	0.52	0.47	0.63	0.67
816	0.55	0.52	0.47	0.63
817	0.41	0.55	0.52	0.47
818	0.59	0.41	0.55	0.52
819	0.36	0.59	0.41	0.55
820	0.67	0.36	0.59	0.41
821	0.35	0.67	0.36	0.59
822	0.13	0.35	0.67	0.36
823	0.56	0.13	0.35	0.67
824	0.57	0.56	0.13	0.35
825	0.64	0.57	0.56	0.13
826	0.61	0.64	0.57	0.56
827	0.22	0.61	0.64	0.57
828	0.25	0.22	0.61	0.64
829	0.66	0.25	0.22	0.61

	cloudCover(t-8)
473	0.83
474	0.66
475	0.58
476	0.27
477	0.12
478	0.17
479	0.68
480	0.83
481	0.84
482	0.81
483	0.60

484	0.54
485	0.37
486	0.27
487	0.65
488	0.69
489	0.64
490	0.50
491	0.59
492	0.78
493	0.61
494	0.69
495	0.85
496	0.83
497	0.68
498	0.69
499	0.48
500	0.50
501	0.59
502	0.66
..	...
800	0.37
801	0.69
802	0.32
803	0.54
804	0.44
805	0.40
806	0.38
807	0.61
808	0.93
809	0.81
810	0.73
811	0.19
812	0.22
813	0.47
814	0.42
815	0.73
816	0.67
817	0.63
818	0.47
819	0.52
820	0.55
821	0.41
822	0.59
823	0.36
824	0.67
825	0.35
826	0.13
827	0.56

```
828             0.57
829             0.64

[357 rows x 41 columns]
```

In [27]:
```
# Convert predictions back to normal values

predi = scaler.inverse_transform(prova)
```

In [28]:
```
#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[28]:
```
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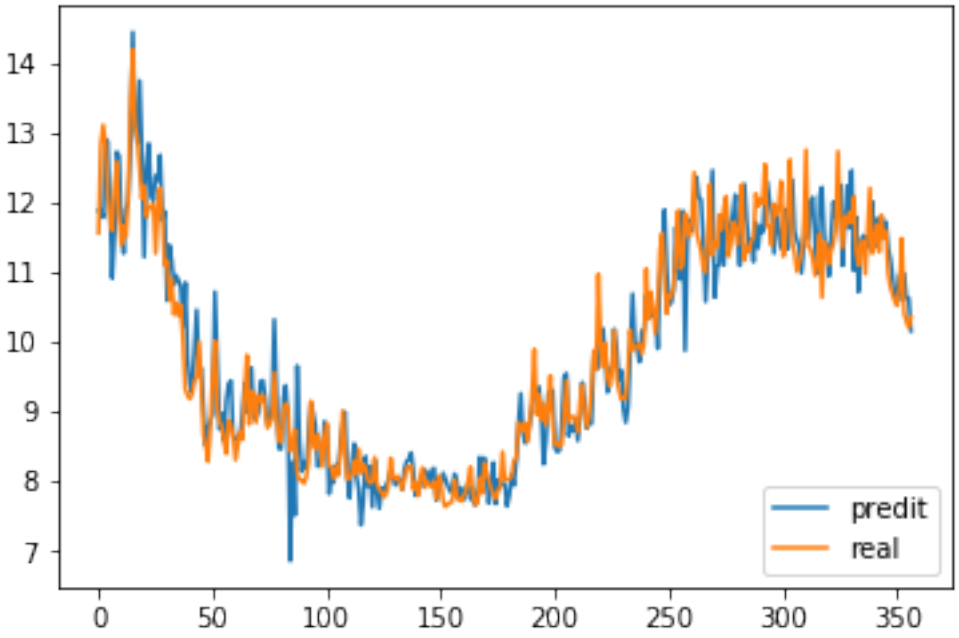
In [29]:
```
##Mostrem
plt.plot(listpredi, label="predit")
plt.plot(listy, label="real")
plt.legend(loc="lower right")
plt.show()
```



In [ ]: