

MM9

_Xarxa_walkforward_normalitzat_multivariate3_multistep

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

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In [2]: daily=pd.read_csv('C:/Users/Laura/Desktop/Smart meters London/workspace R/Dades netes/1')
daily.head(5)
```

```
Out[2]:
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	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 [3]: *#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)

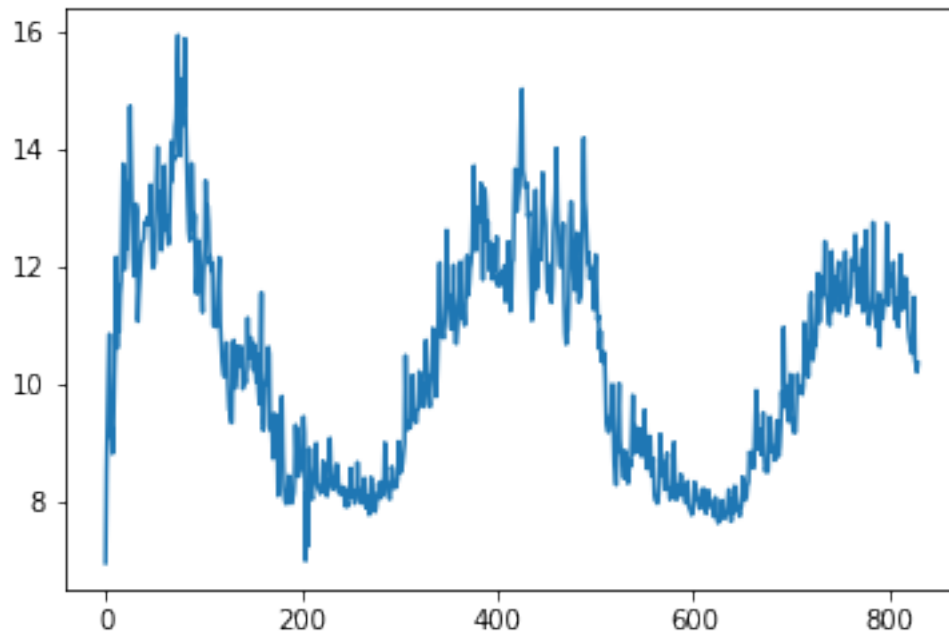
Out[3]:

	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	

	visibility	cloudCover
0	8.06	0.36
1	10.64	0.41
2	12.38	0.48
3	13.07	0.44
4	13.08	0.42

In [16]: plt.plot(daily_dia)

Out[16]: [



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In [4]: daily_dia['y+1']=daily_dia['energy_sum'].shift(-1)
daily_dia['y+2']=daily_dia['energy_sum'].shift(-2)
daily_dia['y+3']=daily_dia['energy_sum'].shift(-3)
daily_dia['y+4']=daily_dia['energy_sum'].shift(-4)
daily_dia['y+5']=daily_dia['energy_sum'].shift(-5)
daily_dia['y+6']=daily_dia['energy_sum'].shift(-6)

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)

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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[4]:

```

	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	y+1	y+2	y+3	...	\
0	8.06	0.36	8.536480	9.499781	10.267707	...	
1	10.64	0.41	9.499781	10.267707	10.850805	...	
2	12.38	0.48	10.267707	10.850805	9.103382	...	
3	13.07	0.44	10.850805	9.103382	9.274873	...	
4	13.08	0.42	9.103382	9.274873	8.813513	...	
5	11.84	0.56	9.274873	8.813513	9.227707	...	
6	12.57	0.60	8.813513	9.227707	10.145910	...	
7	13.05	0.31	9.227707	10.145910	10.780273	...	
8	12.15	0.57	10.145910	10.780273	12.163127	...	
9	11.89	0.32	10.780273	12.163127	10.609714	...	
10	12.70	0.54	12.163127	10.609714	11.673417	...	
11	13.36	0.36	10.609714	11.673417	10.889362	...	
12	13.00	0.20	11.673417	10.889362	11.525150	...	
13	13.15	0.34	10.889362	11.525150	11.759837	...	
14	13.12	0.29	11.525150	11.759837	12.633801	...	
15	12.59	0.53	11.759837	12.633801	13.749174	...	
16	12.83	0.15	12.633801	13.749174	11.951958	...	
17	12.83	0.17	13.749174	11.951958	11.957446	...	
18	12.09	0.56	11.951958	11.957446	12.392776	...	
19	12.05	0.38	11.957446	12.392776	12.307079	...	
20	12.55	0.42	12.392776	12.307079	13.376080	...	
21	13.20	0.36	12.307079	13.376080	13.511968	...	

22	12.79	0.42	13.376080	13.511968	14.732271	...
23	10.96	0.70	13.511968	14.732271	13.774471	...
24	11.64	0.37	14.732271	13.774471	12.709106	...
25	13.04	0.22	13.774471	12.709106	12.148570	...
26	10.43	0.47	12.709106	12.148570	11.839403	...
27	12.89	0.48	12.148570	11.839403	12.254989	...
28	9.41	0.67	11.839403	12.254989	13.065317	...
29	12.99	0.38	12.254989	13.065317	12.949429	...
..
800	9.53	0.93	11.685169	11.857957	11.710582	...
801	6.63	0.81	11.857957	11.710582	12.078164	...
802	7.08	0.73	11.710582	12.078164	11.280011	...
803	11.60	0.19	12.078164	11.280011	11.095584	...
804	12.89	0.22	11.280011	11.095584	11.415105	...
805	12.50	0.47	11.095584	11.415105	11.445403	...
806	12.05	0.42	11.415105	11.445403	10.972318	...
807	10.91	0.73	11.445403	10.972318	11.569300	...
808	10.53	0.67	10.972318	11.569300	12.202967	...
809	10.85	0.63	11.569300	12.202967	11.264175	...
810	11.20	0.47	12.202967	11.264175	11.452649	...
811	12.71	0.52	11.264175	11.452649	11.679099	...
812	11.81	0.55	11.452649	11.679099	11.285737	...
813	12.39	0.41	11.679099	11.285737	11.816914	...
814	11.80	0.59	11.285737	11.816914	11.490470	...
815	13.04	0.36	11.816914	11.490470	11.582159	...
816	11.17	0.67	11.490470	11.582159	10.979566	...
817	12.38	0.35	11.582159	10.979566	10.781898	...
818	12.78	0.13	10.979566	10.781898	10.674624	...
819	10.32	0.56	10.781898	10.674624	10.573835	...
820	11.49	0.57	10.674624	10.573835	10.518126	...
821	9.95	0.64	10.573835	10.518126	10.776242	...
822	10.61	0.61	10.518126	10.776242	11.480411	...
823	13.31	0.22	10.776242	11.480411	10.411403	...
824	13.07	0.25	11.480411	10.411403	10.294997	...
825	12.33	0.66	10.411403	10.294997	10.202945	...
826	13.00	0.50	10.294997	10.202945	10.356350	...
827	12.09	0.62	10.202945	10.356350	NaN	...
828	13.00	0.26	10.356350	NaN	NaN	...
829	12.04	0.32	NaN	NaN	NaN	...

	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 53 columns]

```
In [5]: #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', 'visibility'])
#daily_dia=daily_dia[['energy_sum', 't-1', 't-2', 't-3', 't-4', 't-5', 't-6', 't-7', 't-8', 't-9', 't-10', 't-11', 't-12']]
daily_dia.head(5)
```

```
Out [5]:
```

	energy_sum	y+1	y+2	y+3	y+4	y+5 \
0	6.952692	8.536480	9.499781	10.267707	10.850805	9.103382
1	8.536480	9.499781	10.267707	10.850805	9.103382	9.274873

2	9.499781	10.267707	10.850805	9.103382	9.274873	8.813513
3	10.267707	10.850805	9.103382	9.274873	8.813513	9.227707
4	10.850805	9.103382	9.274873	8.813513	9.227707	10.145910

	y+6	t-1	t-2	t-3	...	visibility(t-7)	\
0	9.274873	NaN	NaN	NaN	...	NaN	
1	8.813513	6.952692	NaN	NaN	...	NaN	
2	9.227707	8.536480	6.952692	NaN	...	NaN	
3	10.145910	9.499781	8.536480	6.952692	...	NaN	
4	10.780273	10.267707	9.499781	8.536480	...	NaN	

	visibility(t-8)	cloudCover(t-1)	cloudCover(t-2)	cloudCover(t-3)	\
0	NaN	NaN	NaN	NaN	
1	NaN	0.36	NaN	NaN	
2	NaN	0.41	0.36	NaN	
3	NaN	0.48	0.41	0.36	
4	NaN	0.44	0.48	0.41	

	cloudCover(t-4)	cloudCover(t-5)	cloudCover(t-6)	cloudCover(t-7)	\
0	NaN	NaN	NaN	NaN	
1	NaN	NaN	NaN	NaN	
2	NaN	NaN	NaN	NaN	
3	NaN	NaN	NaN	NaN	
4	0.36	NaN	NaN	NaN	

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

[5 rows x 47 columns]

In [6]: *#Eliminem les 8 primeres files ja que contenen NaN (valors buits)*

```
daily_dia=daily_dia.drop([0,1,2,3,4,5,6,7])
daily_dia=daily_dia.drop([829,828,827,826,825,824,823])
```

In [7]: len(daily_dia)

Out[7]: 815

In [8]: *#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 [9]: #Seleccionem dades per test i train
```

```
y_daily=daily_dia_norm[:,0:7]
```

```
X_daily=daily_dia_norm[:,7:48]
```

```
#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], 8,5))
```

```
In [10]: # definim model
```

```
import tensorflow as tf
```

```
model =Sequential()
```

```
model.add(LSTM(50, activation='relu', input_shape=(8, 5)))
```

```
model.add(Dense(7))
```

```
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, predictrain))
llista_scoretrain.append(trainScore )

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

sumScores=sumScores+testScore

```

WARNING:tensorflow:From c:\users\laura\appdata\local\programs\python\python37\lib\site-packages: Instructions for updating:
Use tf.cast instead.

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

Out[12]: 0.06788682503172708

In [37]: *#Fem llista amb les prediccions*
llista_p=list()
for i in range(len(llista_prediccions)):
llista_p.append(llista_prediccions[i].tolist())

llista_p

Out[37]: [[0.4917013347148895,
0.47340282797813416,
0.48966366052627563,
0.4917079210281372,
0.5067949295043945,
0.4789063632488251,
0.4803459346294403]],

[[0.4612216651439667,
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```

```

In [56]: #Fem llista amb la predicció de només el dia següent
llista_p0=list()
for i in range(len(llista_p)):
    llista_p0.append(llista_p[i][0][0])

```



```
In [57]: #Fem llista amb la predicció de 2 dies
        llista_p1=list()
        for i in range(len(llista_p)):
            llista_p1.append(llista_p[i][0][1])
```

```
In [58]: #Altres dies
```

```
        llista_p2=list()
        for i in range(len(llista_p)):
            llista_p2.append(llista_p[i][0][2])
```

```
        llista_p3=list()
        for i in range(len(llista_p)):
            llista_p3.append(llista_p[i][0][3])
```

```
        llista_p4=list()
        for i in range(len(llista_p)):
            llista_p4.append(llista_p[i][0][4])
```

```
        llista_p5=list()
        for i in range(len(llista_p)):
            llista_p5.append(llista_p[i][0][5])
```

```
        llista_p6=list()
        for i in range(len(llista_p)):
            llista_p6.append(llista_p[i][0][6])
```

```
In [ ]:
```

```
In [61]: score0=math.sqrt(mean_squared_error(y_daily[n_train:lenght,0], llista_p0))
        print("Error predicció 1 dia següent: {}".format(score0))
        score1=math.sqrt(mean_squared_error(y_daily[n_train:lenght,1], llista_p1))
        print("Error predicció 1 dia següent: {}".format(score1))
        score2=math.sqrt(mean_squared_error(y_daily[n_train:lenght,2], llista_p2))
        print("Error predicció 1 dia següent: {}".format(score2))
        score3=math.sqrt(mean_squared_error(y_daily[n_train:lenght,3], llista_p3))
        print("Error predicció 1 dia següent: {}".format(score3))
        score4=math.sqrt(mean_squared_error(y_daily[n_train:lenght,4], llista_p4))
        print("Error predicció 1 dia següent: {}".format(score4))
        score5=math.sqrt(mean_squared_error(y_daily[n_train:lenght,5], llista_p5))
        print("Error predicció 1 dia següent: {}".format(score5))
        score6=math.sqrt(mean_squared_error(y_daily[n_train:lenght,6], llista_p6))
        print("Error predicció 1 dia següent: {}".format(score6))
```

```
Error predicció 1 dia següent: 0.055251696046144314
Error predicció 1 dia següent: 0.06832529766672948
Error predicció 1 dia següent: 0.07813421105684255
Error predicció 1 dia següent: 0.09076733536533071
Error predicció 1 dia següent: 0.08530721529594153
```

Error predicció 1 dia següent: 0.08309003380499033
Error predicció 1 dia següent: 0.07993006069496253

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

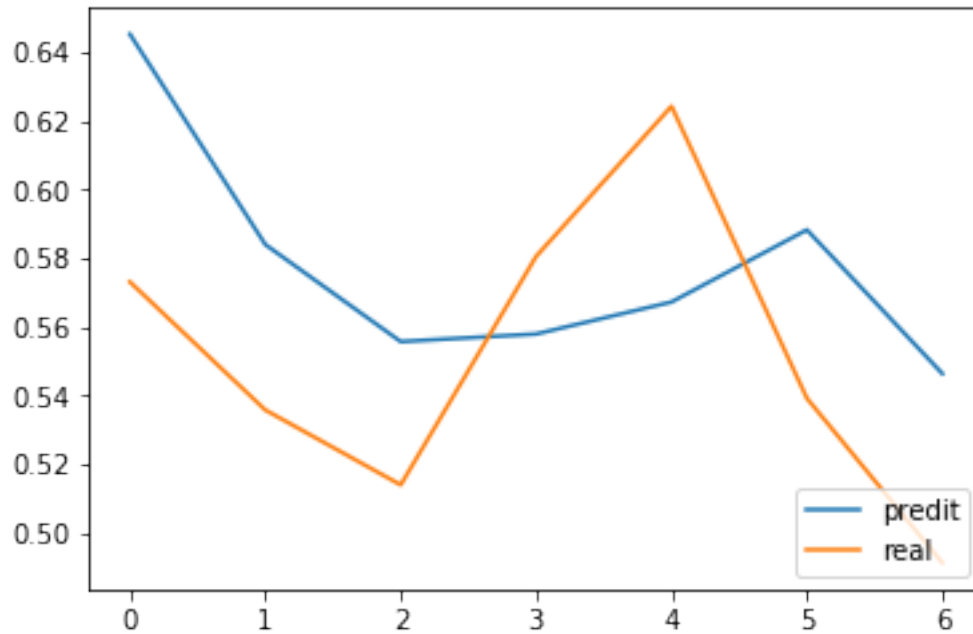
```
    for i in range(len(llista_prediccions)):
        predi=llista_prediccions[i].tolist()
        predis.append(predi)

    predis=np.reshape(predis, (len(llista_prediccions),7) )

    predis
```

```
Out[14]: array([[0.49170133, 0.47340283, 0.48966366, ..., 0.50679493, 0.47890636,
                  0.48034593],
                [0.46122167, 0.46251589, 0.4735243 , ..., 0.5200659 , 0.4861201 ,
                  0.49506193],
                [0.55876654, 0.57786053, 0.59300983, ..., 0.58100706, 0.55766916,
                  0.55555761],
                ...,
                [0.47479051, 0.39193276, 0.46481001, ..., 0.49955657, 0.51752841,
                  0.34443393],
                [0.4404763 , 0.48348251, 0.4443087 , ..., 0.46815312, 0.41918528,
                  0.42251596],
                [0.44794756, 0.41577277, 0.48827636, ..., 0.29434064, 0.39685303,
                  0.3423686 ]])
```

```
In [19]: ##Mostrem
plt.plot(predis[4], label="predict")
plt.plot(y_daily[n_train+4], label="real")
plt.legend(loc="lower right")
plt.show()
```



In [63]: *##Mostrem*

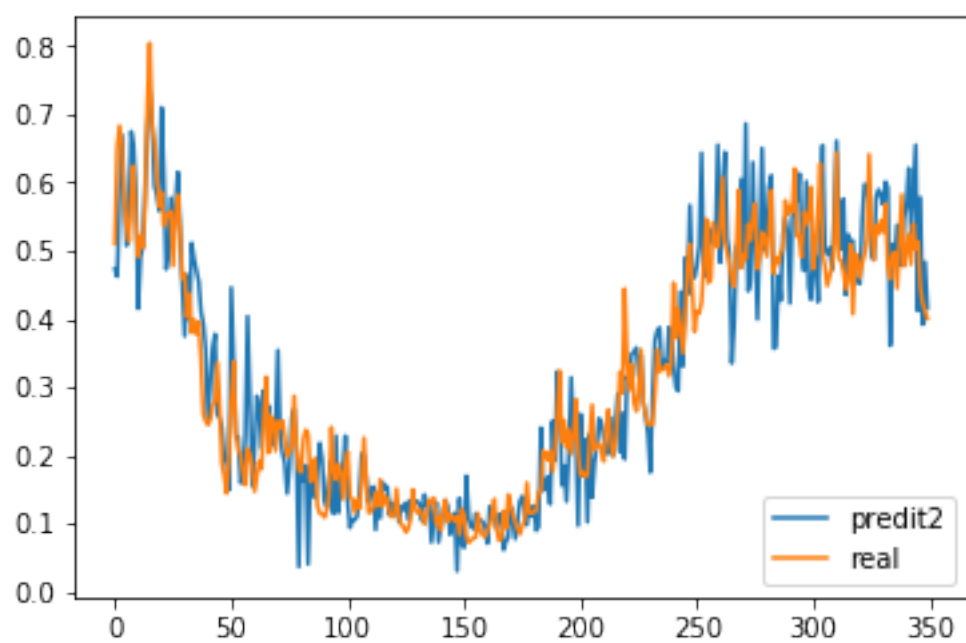
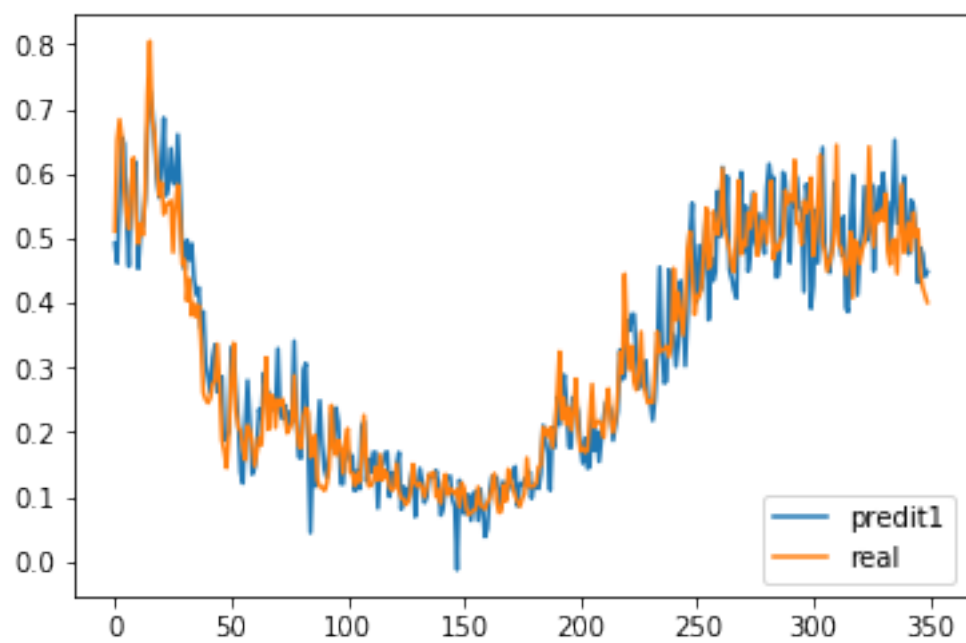
```
plt.plot(l1lista_p0, label="predit1")
plt.plot(y_daily[n_train:lenght,0], label="real")
plt.legend(loc="lower right")
plt.show()
```

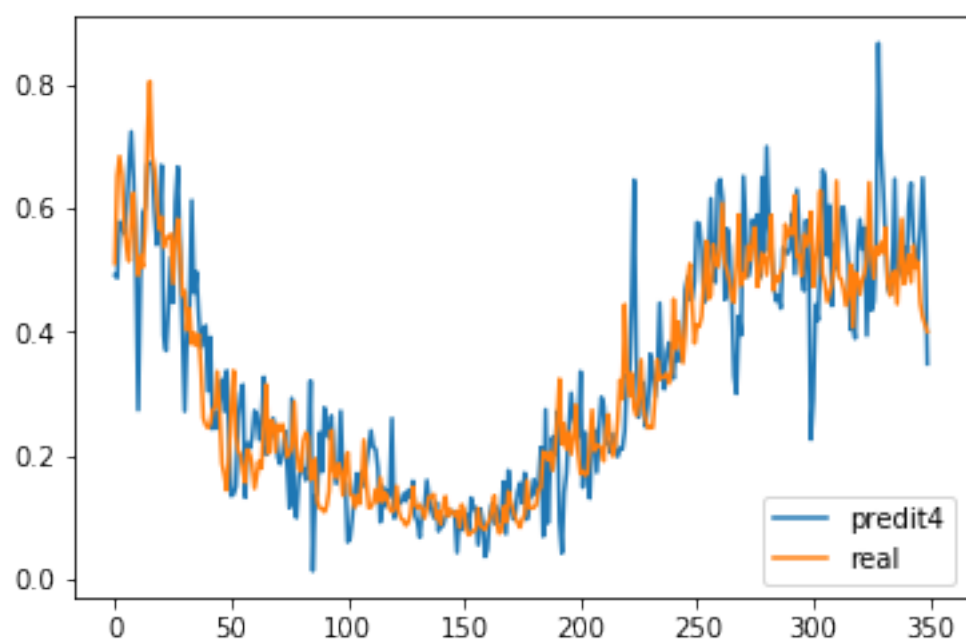
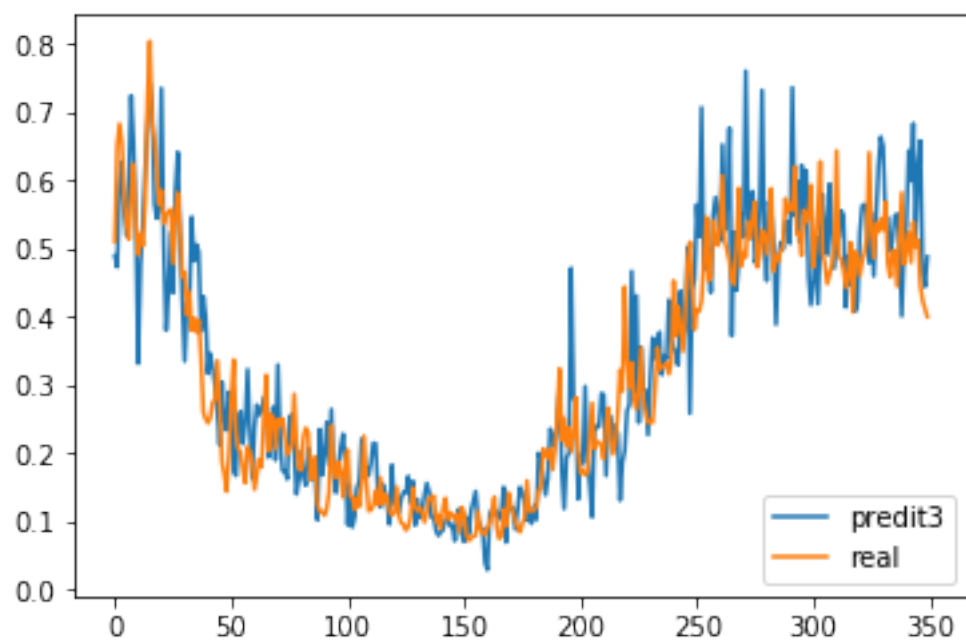
```
plt.plot(l1lista_p1, label="predit2")
plt.plot(y_daily[n_train:lenght,0], label="real")
plt.legend(loc="lower right")
plt.show()
```

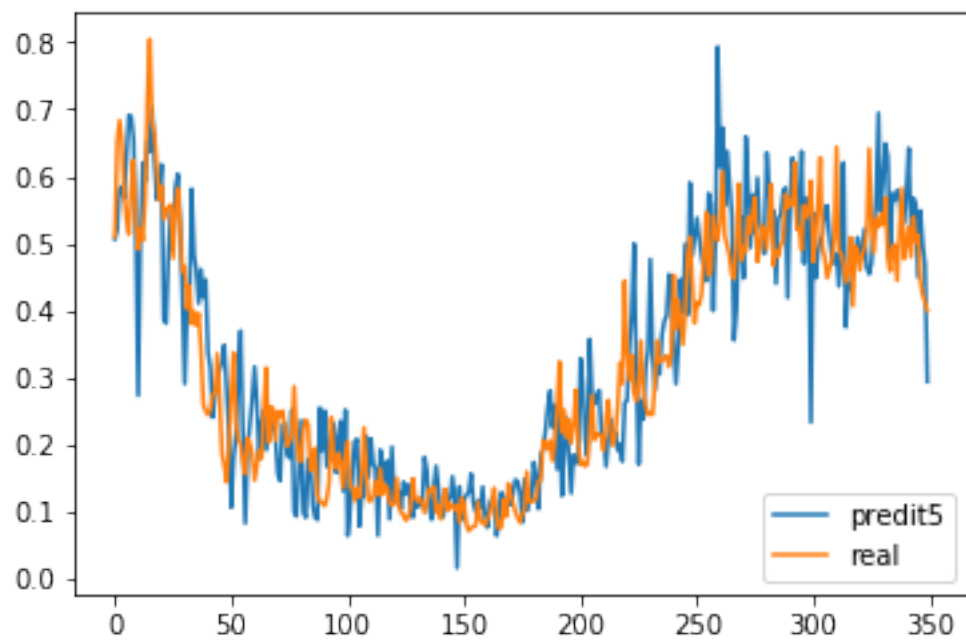
```
plt.plot(l1lista_p2, label="predit3")
plt.plot(y_daily[n_train:lenght,0], label="real")
plt.legend(loc="lower right")
plt.show()
```

```
plt.plot(l1lista_p3, label="predit4")
plt.plot(y_daily[n_train:lenght,0], label="real")
plt.legend(loc="lower right")
plt.show()
```

```
plt.plot(l1lista_p4, label="predit5")
plt.plot(y_daily[n_train:lenght,0], label="real")
plt.legend(loc="lower right")
plt.show()
```







In []:

In []: