

MM4

_Xarxa_walkforward_normalitzat_multivariate2_multistep_7

dies

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/1')
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

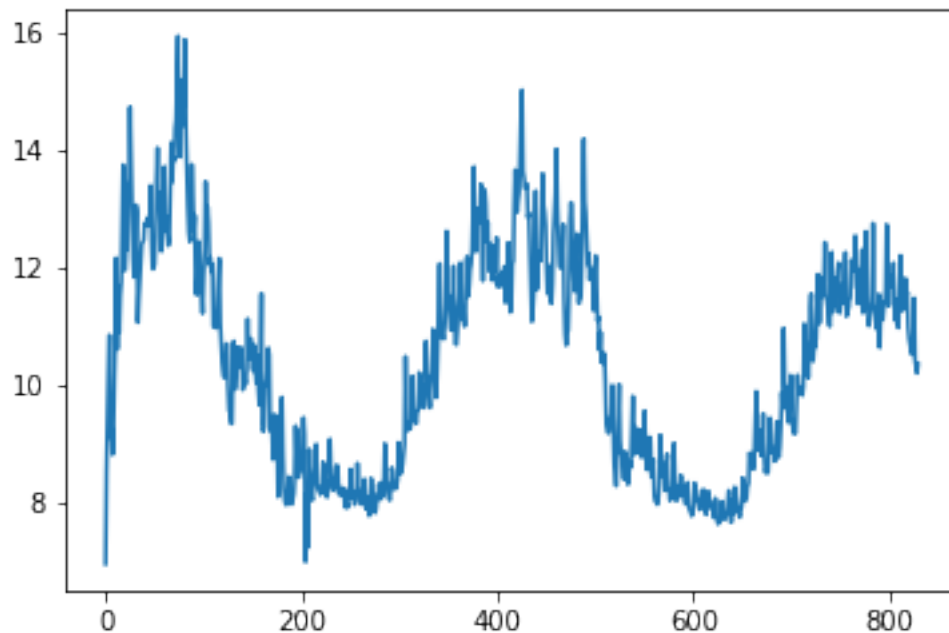
```
In [3]: #Ens quedem amb date i energy_sum, ordenem valors per data i resetejem index
daily_dia=daily[['date','energy_sum','apparentTemperatureMax','humidity']].sort_values
daily_dia.head(5)
```

```
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

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

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



```
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)
```

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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['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['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

```

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

	y+1	y+2	y+3	y+4	y+5	...	temp(t-5)	\
0	8.536480	9.499781	10.267707	10.850805	9.103382	...	NaN	
1	9.499781	10.267707	10.850805	9.103382	9.274873	...	NaN	
2	10.267707	10.850805	9.103382	9.274873	8.813513	...	NaN	
3	10.850805	9.103382	9.274873	8.813513	9.227707	...	NaN	
4	9.103382	9.274873	8.813513	9.227707	10.145910	...	NaN	
5	9.274873	8.813513	9.227707	10.145910	10.780273	...	10.36	
6	8.813513	9.227707	10.145910	10.780273	12.163127	...	12.93	
7	9.227707	10.145910	10.780273	12.163127	10.609714	...	13.03	
8	10.145910	10.780273	12.163127	10.609714	11.673417	...	12.96	
9	10.780273	12.163127	10.609714	11.673417	10.889362	...	13.54	
10	12.163127	10.609714	11.673417	10.889362	11.525150	...	12.58	
11	10.609714	11.673417	10.889362	11.525150	11.759837	...	13.47	
12	11.673417	10.889362	11.525150	11.759837	12.633801	...	11.87	
13	10.889362	11.525150	11.759837	12.633801	13.749174	...	12.15	
14	11.525150	11.759837	12.633801	13.749174	11.951958	...	5.33	
15	11.759837	12.633801	13.749174	11.951958	11.957446	...	11.42	
16	12.633801	13.749174	11.951958	11.957446	12.392776	...	6.66	
17	13.749174	11.951958	11.957446	12.392776	12.307079	...	3.13	
18	11.951958	11.957446	12.392776	12.307079	13.376080	...	3.77	
19	11.957446	12.392776	12.307079	13.376080	13.511968	...	5.14	
20	12.392776	12.307079	13.376080	13.511968	14.732271	...	12.89	
21	12.307079	13.376080	13.511968	14.732271	13.774471	...	3.99	
22	13.376080	13.511968	14.732271	13.774471	12.709106	...	3.14	
23	13.511968	14.732271	13.774471	12.709106	12.148570	...	5.72	
24	14.732271	13.774471	12.709106	12.148570	11.839403	...	5.94	
25	13.774471	12.709106	12.148570	11.839403	12.254989	...	12.08	
26	12.709106	12.148570	11.839403	12.254989	13.065317	...	2.88	
27	12.148570	11.839403	12.254989	13.065317	12.949429	...	4.38	
28	11.839403	12.254989	13.065317	12.949429	11.065577	...	0.99	
29	12.254989	13.065317	12.949429	11.065577	11.494944	...	1.72	
..	
800	11.685169	11.857957	11.710582	12.078164	11.280011	...	5.72	
801	11.857957	11.710582	12.078164	11.280011	11.095584	...	11.77	
802	11.710582	12.078164	11.280011	11.095584	11.415105	...	5.99	
803	12.078164	11.280011	11.095584	11.415105	11.445403	...	4.34	
804	11.280011	11.095584	11.415105	11.445403	10.972318	...	6.34	
805	11.095584	11.415105	11.445403	10.972318	11.569300	...	2.53	
806	11.415105	11.445403	10.972318	11.569300	12.202967	...	5.86	
807	11.445403	10.972318	11.569300	12.202967	11.264175	...	5.27	
808	10.972318	11.569300	12.202967	11.264175	11.452649	...	6.86	
809	11.569300	12.202967	11.264175	11.452649	11.679099	...	6.48	
810	12.202967	11.264175	11.452649	11.679099	11.285737	...	4.59	
811	11.264175	11.452649	11.679099	11.285737	11.816914	...	5.63	
812	11.452649	11.679099	11.285737	11.816914	11.490470	...	5.86	
813	11.679099	11.285737	11.816914	11.490470	11.582159	...	7.34	
814	11.285737	11.816914	11.490470	11.582159	10.979566	...	8.44	
815	11.816914	11.490470	11.582159	10.979566	10.781898	...	5.67	

816	11.490470	11.582159	10.979566	10.781898	10.674624	...	3.91
817	11.582159	10.979566	10.781898	10.674624	10.573835	...	7.07
818	10.979566	10.781898	10.674624	10.573835	10.518126	...	4.06
819	10.781898	10.674624	10.573835	10.518126	10.776242	...	4.73
820	10.674624	10.573835	10.518126	10.776242	11.480411	...	3.42
821	10.573835	10.518126	10.776242	11.480411	10.411403	...	12.02
822	10.518126	10.776242	11.480411	10.411403	10.294997	...	5.79
823	10.776242	11.480411	10.411403	10.294997	10.202945	...	7.88
824	11.480411	10.411403	10.294997	10.202945	10.356350	...	10.67
825	10.411403	10.294997	10.202945	10.356350	NaN	...	10.13
826	10.294997	10.202945	10.356350	NaN	NaN	...	10.13
827	10.202945	10.356350	NaN	NaN	NaN	...	12.50
828	10.356350	NaN	NaN	NaN	NaN	...	10.15
829	NaN	NaN	NaN	NaN	NaN	...	11.63

	temp(t-6)	temp(t-7)	humidity(t-1)	humidity(t-2)	humidity(t-3)	\
0	NaN	NaN	NaN	NaN	NaN	
1	NaN	NaN	0.93	NaN	NaN	
2	NaN	NaN	0.89	0.93	NaN	
3	NaN	NaN	0.79	0.89	0.93	
4	NaN	NaN	0.81	0.79	0.89	
5	NaN	NaN	0.72	0.81	0.79	
6	10.36	NaN	0.86	0.72	0.81	
7	12.93	10.36	0.82	0.86	0.72	
8	13.03	12.93	0.78	0.82	0.86	
9	12.96	13.03	0.82	0.78	0.82	
10	13.54	12.96	0.87	0.82	0.78	
11	12.58	13.54	0.79	0.87	0.82	
12	13.47	12.58	0.82	0.79	0.87	
13	11.87	13.47	0.77	0.82	0.79	
14	12.15	11.87	0.83	0.77	0.82	
15	5.33	12.15	0.68	0.83	0.77	
16	11.42	5.33	0.81	0.68	0.83	
17	6.66	11.42	0.71	0.81	0.68	
18	3.13	6.66	0.81	0.71	0.81	
19	3.77	3.13	0.88	0.81	0.71	
20	5.14	3.77	0.84	0.88	0.81	
21	12.89	5.14	0.75	0.84	0.88	
22	3.99	12.89	0.79	0.75	0.84	
23	3.14	3.99	0.77	0.79	0.75	
24	5.72	3.14	0.88	0.77	0.79	
25	5.94	5.72	0.86	0.88	0.77	
26	12.08	5.94	0.84	0.86	0.88	
27	2.88	12.08	0.94	0.84	0.86	
28	4.38	2.88	0.81	0.94	0.84	
29	0.99	4.38	0.94	0.81	0.94	
..	
800	4.93	10.02	0.83	0.79	0.79	

801	5.72	4.93	0.90	0.83	0.79
802	11.77	5.72	0.91	0.90	0.83
803	5.99	11.77	0.91	0.91	0.90
804	4.34	5.99	0.76	0.91	0.91
805	6.34	4.34	0.72	0.76	0.91
806	2.53	6.34	0.79	0.72	0.76
807	5.86	2.53	0.75	0.79	0.72
808	5.27	5.86	0.77	0.75	0.79
809	6.86	5.27	0.82	0.77	0.75
810	6.48	6.86	0.79	0.82	0.77
811	4.59	6.48	0.77	0.79	0.82
812	5.63	4.59	0.66	0.77	0.79
813	5.86	5.63	0.84	0.66	0.77
814	7.34	5.86	0.76	0.84	0.66
815	8.44	7.34	0.75	0.76	0.84
816	5.67	8.44	0.68	0.75	0.76
817	3.91	5.67	0.81	0.68	0.75
818	7.07	3.91	0.69	0.81	0.68
819	4.06	7.07	0.76	0.69	0.81
820	4.73	4.06	0.83	0.76	0.69
821	3.42	4.73	0.87	0.83	0.76
822	12.02	3.42	0.87	0.87	0.83
823	5.79	12.02	0.84	0.87	0.87
824	7.88	5.79	0.72	0.84	0.87
825	10.67	7.88	0.71	0.72	0.84
826	10.13	10.67	0.76	0.71	0.72
827	10.13	10.13	0.74	0.76	0.71
828	12.50	10.13	0.78	0.74	0.76
829	10.15	12.50	0.73	0.78	0.74

	humidity(t-4)	humidity(t-5)	humidity(t-6)	humidity(t-7)
0	NaN	NaN	NaN	NaN
1	NaN	NaN	NaN	NaN
2	NaN	NaN	NaN	NaN
3	NaN	NaN	NaN	NaN
4	0.93	NaN	NaN	NaN
5	0.89	0.93	NaN	NaN
6	0.79	0.89	0.93	NaN
7	0.81	0.79	0.89	0.93
8	0.72	0.81	0.79	0.89
9	0.86	0.72	0.81	0.79
10	0.82	0.86	0.72	0.81
11	0.78	0.82	0.86	0.72
12	0.82	0.78	0.82	0.86
13	0.87	0.82	0.78	0.82
14	0.79	0.87	0.82	0.78
15	0.82	0.79	0.87	0.82
16	0.77	0.82	0.79	0.87

17	0.83	0.77	0.82	0.79
18	0.68	0.83	0.77	0.82
19	0.81	0.68	0.83	0.77
20	0.71	0.81	0.68	0.83
21	0.81	0.71	0.81	0.68
22	0.88	0.81	0.71	0.81
23	0.84	0.88	0.81	0.71
24	0.75	0.84	0.88	0.81
25	0.79	0.75	0.84	0.88
26	0.77	0.79	0.75	0.84
27	0.88	0.77	0.79	0.75
28	0.86	0.88	0.77	0.79
29	0.84	0.86	0.88	0.77
..
800	0.83	0.83	0.82	0.87
801	0.79	0.83	0.83	0.82
802	0.79	0.79	0.83	0.83
803	0.83	0.79	0.79	0.83
804	0.90	0.83	0.79	0.79
805	0.91	0.90	0.83	0.79
806	0.91	0.91	0.90	0.83
807	0.76	0.91	0.91	0.90
808	0.72	0.76	0.91	0.91
809	0.79	0.72	0.76	0.91
810	0.75	0.79	0.72	0.76
811	0.77	0.75	0.79	0.72
812	0.82	0.77	0.75	0.79
813	0.79	0.82	0.77	0.75
814	0.77	0.79	0.82	0.77
815	0.66	0.77	0.79	0.82
816	0.84	0.66	0.77	0.79
817	0.76	0.84	0.66	0.77
818	0.75	0.76	0.84	0.66
819	0.68	0.75	0.76	0.84
820	0.81	0.68	0.75	0.76
821	0.69	0.81	0.68	0.75
822	0.76	0.69	0.81	0.68
823	0.83	0.76	0.69	0.81
824	0.87	0.83	0.76	0.69
825	0.87	0.87	0.83	0.76
826	0.84	0.87	0.87	0.83
827	0.72	0.84	0.87	0.87
828	0.71	0.72	0.84	0.87
829	0.76	0.71	0.72	0.84

[830 rows x 32 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'], axis=1)
#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 [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	...	temp(t-5)	temp(t-6)	\
0	9.274873	NaN	NaN	NaN	...	NaN	NaN	
1	8.813513	6.952692	NaN	NaN	...	NaN	NaN	
2	9.227707	8.536480	6.952692	NaN	...	NaN	NaN	
3	10.145910	9.499781	8.536480	6.952692	...	NaN	NaN	
4	10.780273	10.267707	9.499781	8.536480	...	NaN	NaN	

	temp(t-7)	humidity(t-1)	humidity(t-2)	humidity(t-3)	humidity(t-4)	\
0	NaN	NaN	NaN	NaN	NaN	
1	NaN	0.93	NaN	NaN	NaN	
2	NaN	0.89	0.93	NaN	NaN	
3	NaN	0.79	0.89	0.93	NaN	
4	NaN	0.81	0.79	0.89	0.93	

	humidity(t-5)	humidity(t-6)	humidity(t-7)
0	NaN	NaN	NaN
1	NaN	NaN	NaN
2	NaN	NaN	NaN
3	NaN	NaN	NaN
4	NaN	NaN	NaN

[5 rows x 28 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])
daily_dia=daily_dia.drop([829,828,827,826,825,824,823])
```

```
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 [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[:,7:32]
```

```
#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], 7,3))
```

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

```
import tensorflow as tf
```

```
model =Sequential()
```

```
model.add(LSTM(50, activation='relu', input_shape=(7, 3)))
```

```
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]: 0.06033992050178901

In [13]: *#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[13]: [[0.47505271434783936,
0.4601247012615204,
0.46164554357528687,
0.44669777154922485,
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```

```
In [14]: #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 [15]: #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 [16]: #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 [17]: 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 2 dia següent: {}".format(score1))  
score2=math.sqrt(mean_squared_error(y_daily[n_train:lenght,2], llista_p2))  
print("Error predicció 3 dia següent: {}".format(score2))  
score3=math.sqrt(mean_squared_error(y_daily[n_train:lenght,3], llista_p3))  
print("Error predicció 4 dia següent: {}".format(score3))  
score4=math.sqrt(mean_squared_error(y_daily[n_train:lenght,4], llista_p4))  
print("Error predicció 5 dia següent: {}".format(score4))  
score5=math.sqrt(mean_squared_error(y_daily[n_train:lenght,5], llista_p5))  
print("Error predicció 6 dia següent: {}".format(score5))
```

```
score6=math.sqrt(mean_squared_error(y_daily[n_train:lenght,6], llista_p6))
print("Error predicció 7 dia següent: {}".format(score6))
```

```
Error predicció 1 dia següent: 0.04975955658693996
Error predicció 2 dia següent: 0.06420079884421213
Error predicció 3 dia següent: 0.06884187128687086
Error predicció 4 dia següent: 0.07035422316853544
Error predicció 5 dia següent: 0.07254077215230657
Error predicció 6 dia següent: 0.0715804144599901
Error predicció 7 dia següent: 0.0740504058150359
```

```
In [18]: predis=list()
```

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

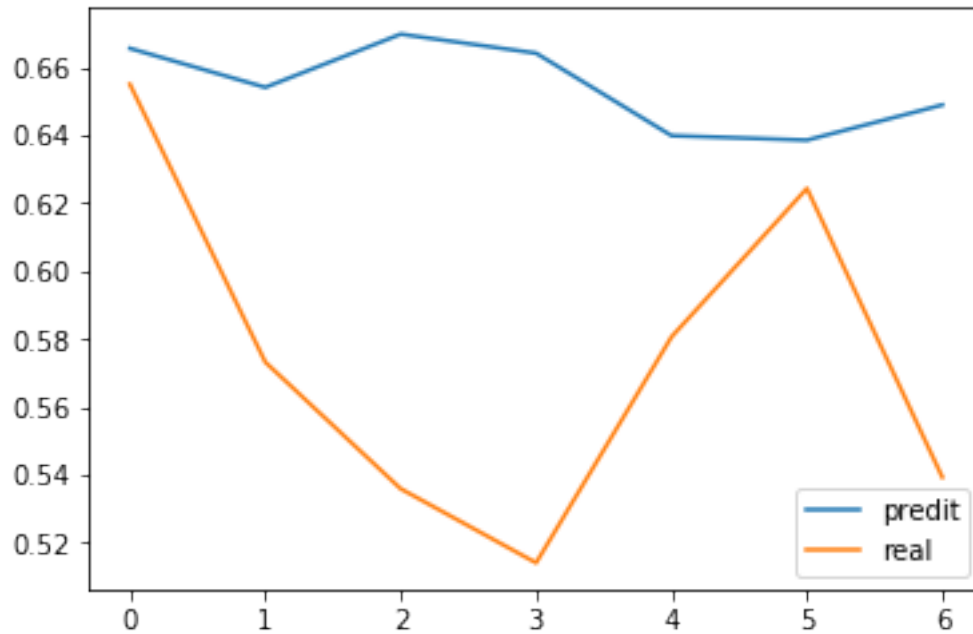
```
predis=np.reshape(predis, (len(llista_prediccions),7) )
```

```
predis
```

```
Out[18]: array([[0.47505271, 0.4601247 , 0.46164554, ..., 0.45837522, 0.45488119,
                  0.45954892],
                [0.43478709, 0.42017138, 0.44147265, ..., 0.4388338 , 0.42266944,
                  0.43323866],
                [0.48552036, 0.48532718, 0.48447308, ..., 0.48912787, 0.48586544,
                  0.48541611],
                ...,
                [0.49909586, 0.45631331, 0.48773682, ..., 0.51776969, 0.47214293,
                  0.44204101],
                [0.38323864, 0.47044623, 0.519023 , ..., 0.42142859, 0.43846232,
                  0.43210453],
                [0.4610346 , 0.51375842, 0.52927363, ..., 0.33719963, 0.39687079,
                  0.42260802]])
```

```
In [19]: ##Mostrem
```

```
plt.plot(predis[4], label="predit")
plt.plot(y_daily[n_train+4], label="real")
plt.legend(loc="lower right")
plt.show()
```

```
In [22]: ##Mostrem
plt.plot(llista_p0, label="predit1")
plt.plot(y_daily[n_train:lenght,0], label="real")
plt.legend(loc="lower right")
plt.title("Predicció 1 dia següent")
plt.show()

plt.plot(llista_p1, label="predit2")
plt.plot(y_daily[n_train:lenght,1], label="real")
plt.legend(loc="lower right")
plt.title("Predicció 2 dia següent")
plt.show()

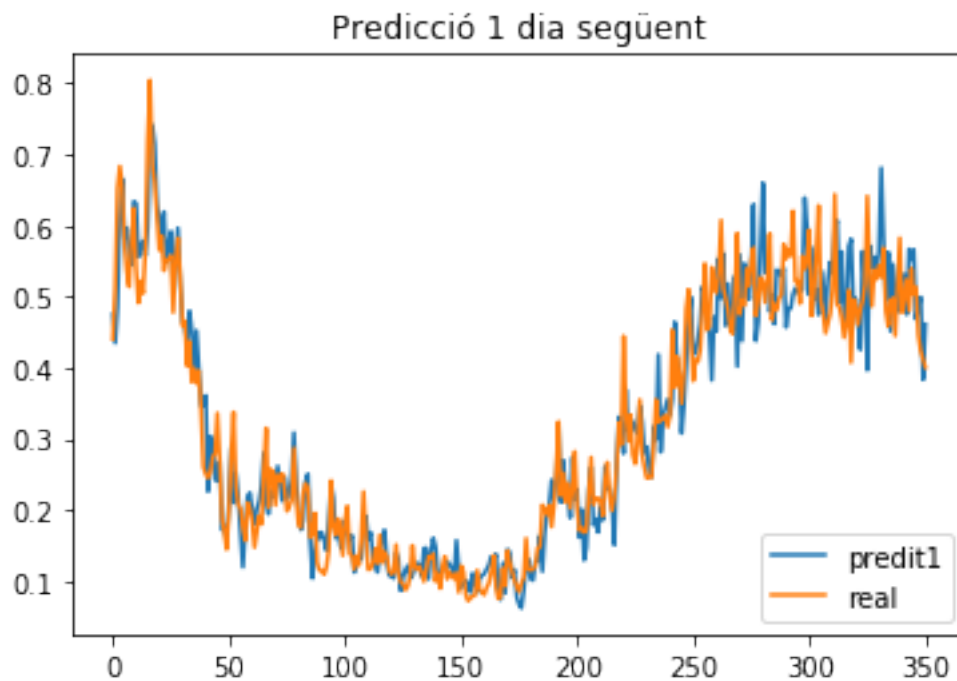
plt.plot(llista_p2, label="predit3")
plt.plot(y_daily[n_train:lenght,2], label="real")
plt.legend(loc="lower right")
plt.title("Predicció 3 dia següent")
plt.show()

plt.plot(llista_p3, label="predit4")
plt.plot(y_daily[n_train:lenght,3], label="real")
plt.legend(loc="lower right")
plt.title("Predicció 4 dia següent")
plt.show()
```

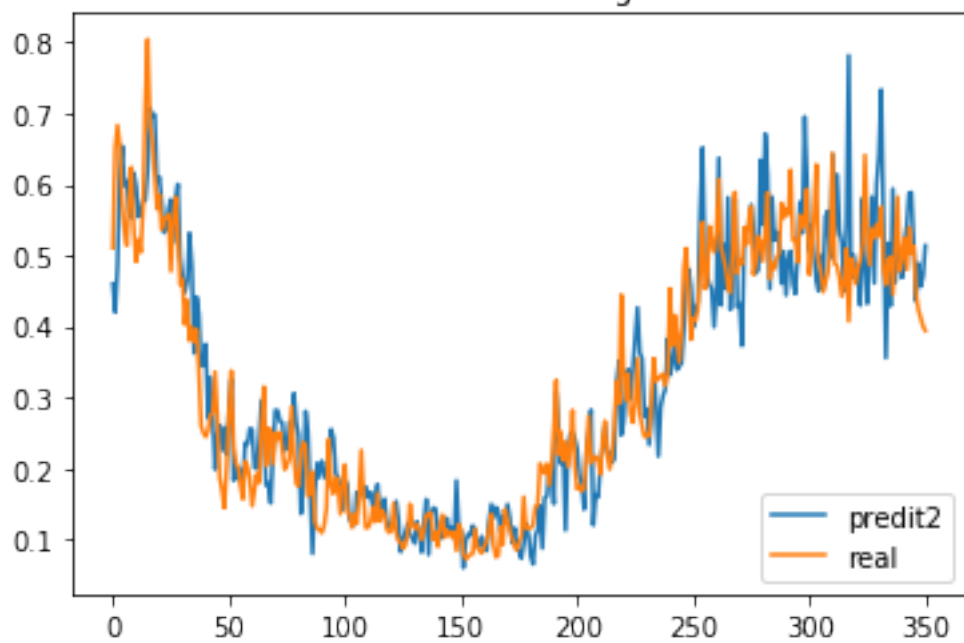
```
plt.plot(llista_p4, label="predit5")
plt.plot(y_daily[n_train:lenght,4], label="real")
plt.legend(loc="lower right")
plt.title("Predicció 5 dia següent")
plt.show()
```

```
plt.plot(llista_p5, label="predit6")
plt.plot(y_daily[n_train:lenght,5], label="real")
plt.legend(loc="lower right")
plt.title("Predicció 6 dia següent")
plt.show()
```

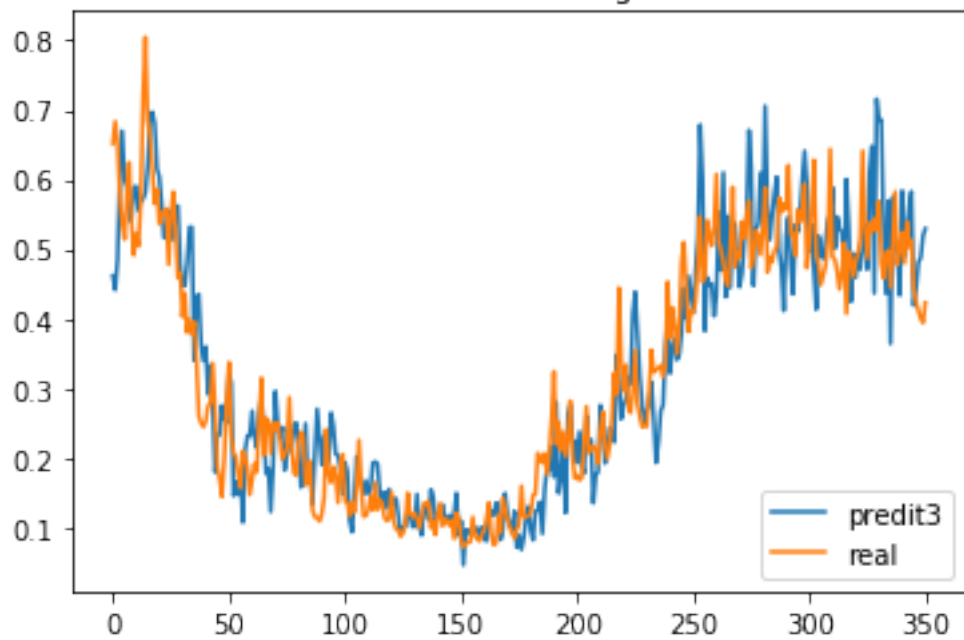
```
plt.plot(llista_p6, label="predit7")
plt.plot(y_daily[n_train:lenght,6], label="real")
plt.legend(loc="lower right")
plt.title("Predicció 7 dia següent")
plt.show()
```



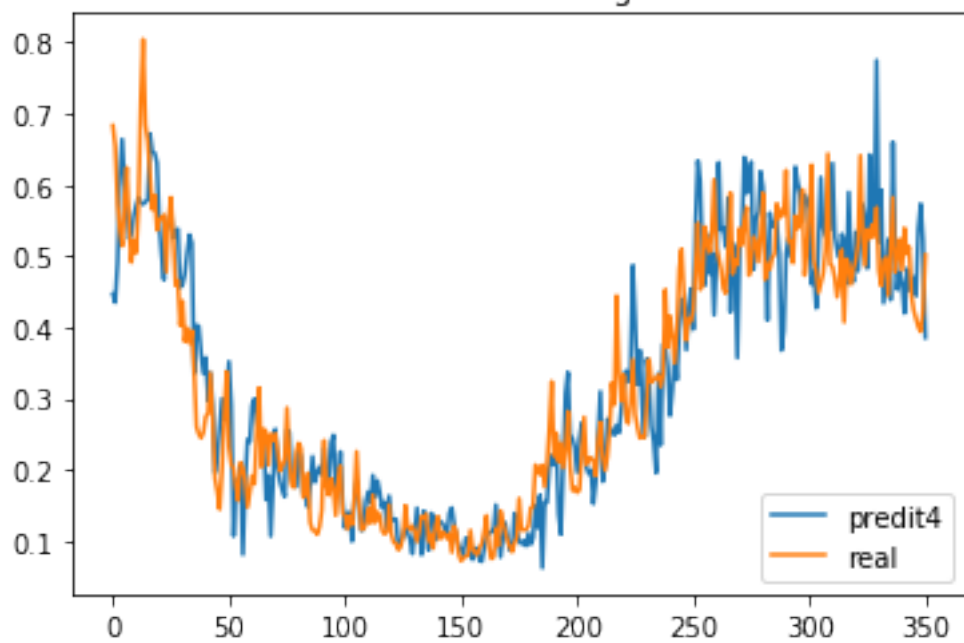
Predicció 2 dia següent



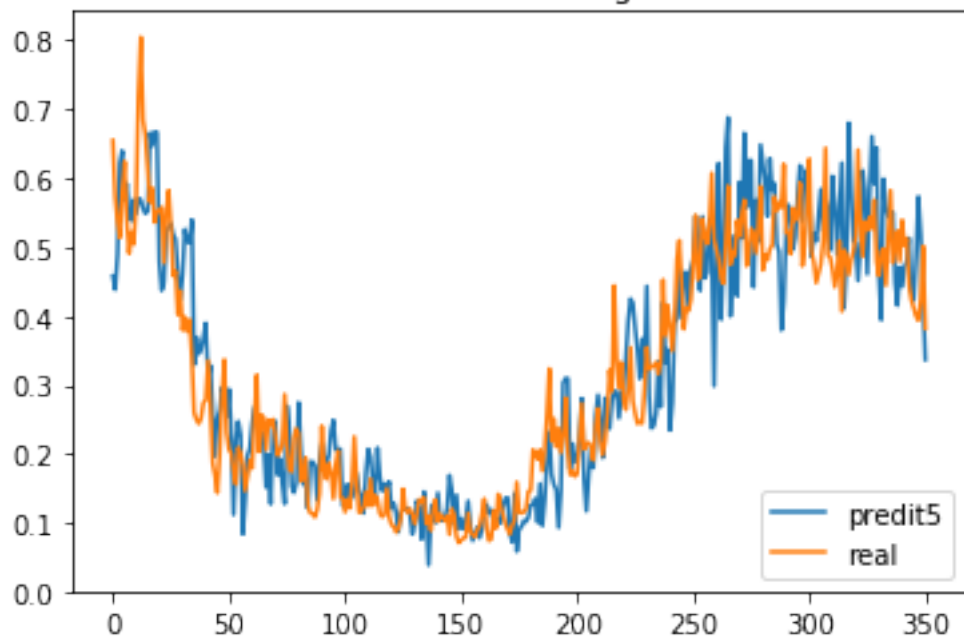
Predicció 3 dia següent



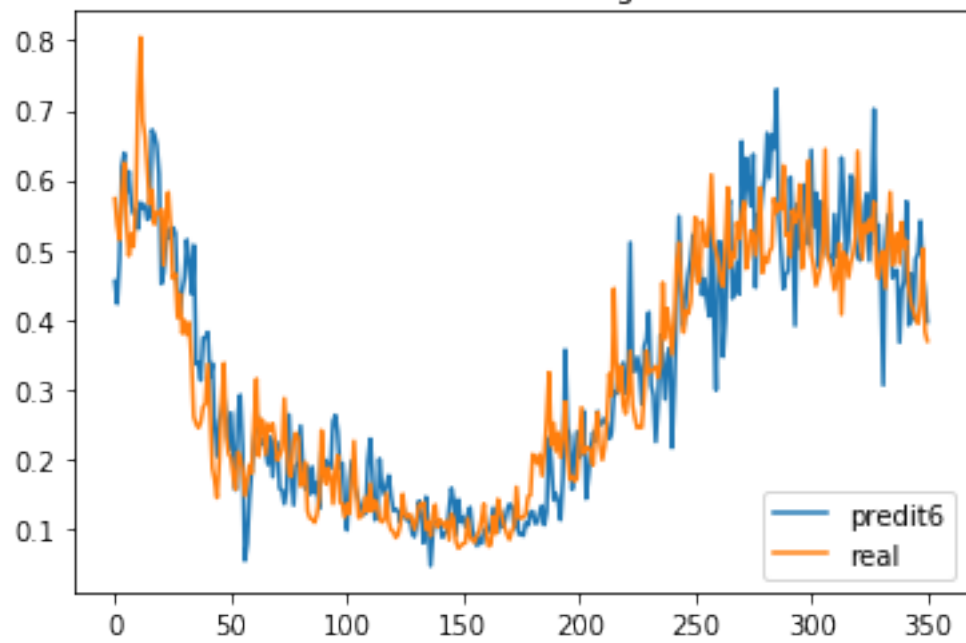
Predicció 4 dia següent



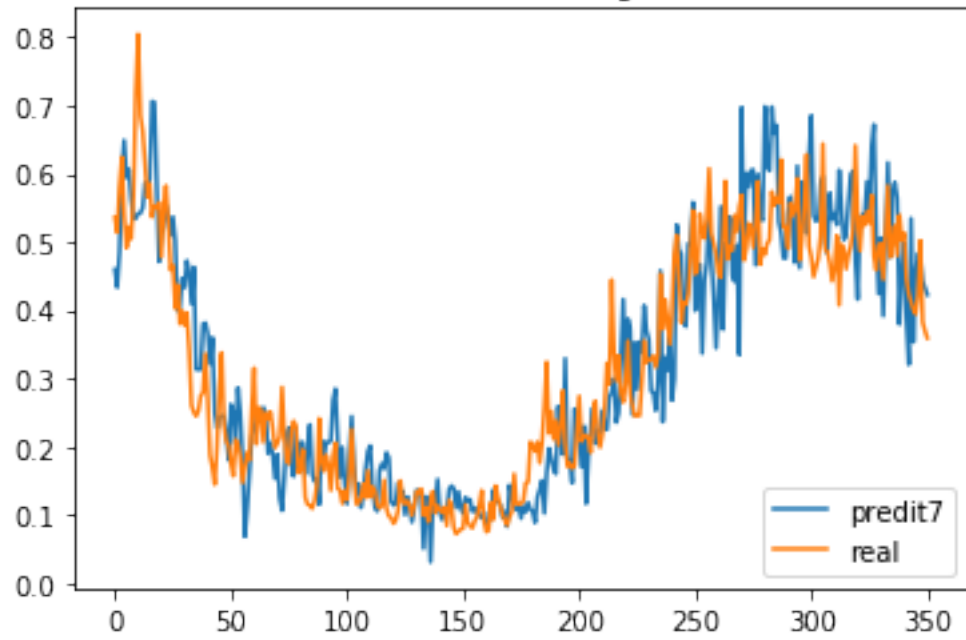
Predicció 5 dia següent



Predicció 6 dia següent



Predicció 7 dia següent



In []:

In []: