Exam - Time series forecasting

Julien JACQUES

	A	B	C
1	Timestamp	Power (kW)	Temp (C°)
2	1/1/2010 1:15	165,1	10,6
3	1/1/2010 1:30	151,6	10,6
4	1/1/2010 1:45	146,9	10,6
5	1/1/2010 2:00	153,7	10,6
6	1/1/2010 2:15	153,8	10,6
7	1/1/2010 2:30	159,0	10,6
8	1/1/2010 2:45	157,7	10,6
9	1/1/2010 3:00	163,2	10,6
10	1/1/2010 3:15	151,7	10,0
11	1/1/2010 3:30	148,7	10,0
12	1/1/2010 3:45	155,1	10,0
13	1/1/2010 4:00	161,5	10,0
14	1/1/2010 4:15	161,5	10,0

Figure 1: `Elec-train.xlsx`

The file `Elec-train.xlsx` contains electricity consumption (kW) and outdoor air temperature for one building. These quantities are measured every 15 minutes, from 1/1/2010 1:15 to 2/18/2010 23:45. In addition, outdoor air temperature are available for 2/17/2010. The goal is to forecast **electricity consumption (kW) for 2/19/2010**.

Part 1

The first part of the evaluation concerns the use and the comparison of all the forecasting models studied during the course (exponential smoothing, SARIMA, Neural Net, LSTM, XGBoost, Random Forest, SVM...). So you have to test all the models we saw during the course, to tune their hyperparameters and compare them properly.

Then, once the best model has been selected, you should return its forecast, in one Excel file entitled `YourName.xlsx`, with **exactly** one column and 96 rows. Its quality, in comparison with the forecasts of the other students, will be take into account in the grading.

Part 2

In the second part of the evaluation, you should implement the WNN forecasting method (described in Section 3.1 of [1]) in a complete R package, with a vignette demonstrating the use of this package. This package, entitled `YourName.tar.gz`, must be able to be installed on my MacBook and I must be able to run the vignette example. Finally, this package should be used to compare the WNN method with the forecast you did in part 1.

Expected deliverable

In addition to your forecast and your package, you should also return a short report (few pages), entitled `YourName.pdf`, explaining how you have proceeded to select the best forecasting model, and presenting also the results obtained with the WNN method.

Reference

[1] Talavera-Llames, R.L., Pérez-Chacón, R., Martínez-Ballesteros, M., Troncoso, A., Martínez-Álvarez, F. (2016). A Nearest Neighbours-Based Algorithm for Big Time Series Data Forecasting. In: Martínez-Álvarez, F., Troncoso, A., Quintián, H., Corchado, E. (eds) Hybrid Artificial Intelligent Systems. HAIS 2016. Lecture Notes in Computer Science, vol 9648. Springer, Cham.