

Part 1

The time series presented in Excel file PW1a.xlsx (sheet Data, column B) represents the evolution of variable Y. The first column (ID) is a sequential number, useful for identifying and referencing the series element; the values in the second column characterize the temporal evolution of Y. The data gaps (unknown values) are marked with “?” and correspond to test set.

The main objective of this work is to create regression models based on the following techniques:

1. Classical time series analysis (ARMA model, Box-Jenkins approach).
2. Neural networks.

Part 2

The sheet Data of the Excel file PW1b.xlsx shows, in column J, the temporal evolution of the power associated with a particular type of the Load of a given electrical system. In the days/hours for which this magnitude is unknown, the cells are signalized with “?”. These cases of unknown consumption are aggregated in the sheet named Test.

In addition to consumption, the file includes calendar information (year, month, etc.). The variable weekday is codified as follows: Sunday=1, Monday=2, etc. The measured temperature is presented in column G. Columns H and I contain information on two types of particular days such as holidays.

The main objective of this challenge is to create a Neural Network model for forecasting loads 48 hours ahead – the inputs of the model must not include load or temperature values from the 48h prior to the forecast time. Each student should provide her/his forecasts of the cases identified in the Test sheet.

Rules to consider:

1. The estimate obtained with each of the techniques in Part 1 must be specified in the columns C and D of PW1a.xlsx (blue background).
2. The load forecast for Part 2 must be specified in the Test sheet of PW1b.xlsx.
3. For each part, each student must submit a concise report (1 page A4) that summarizes the tests performed and the main results obtained (model performance indicators). It should be noted that, although it is allowed to work in groups, the submitted material (estimations, reports, etc.) should be individual – frauds will be penalized with the invalidation of the work.
4. The elements referred to in the preceding paragraphs should be sent by email jfidalgo@fe.up.pt.
5. The Files submitted should be identified with the author's name; for example, the student Nick Cave should send a file identified as NickCave.zip or similar.