ELEN0445-1 Microgrids

Assignment 4: Forecasting

Introduction. The goal of this fourth assignment is to make you implement some of the algorithms used for forecasting. You will have to predict the consumption of the Montefiore institute every quarter of an hour.

For that you will have to implement the different forecasting models using scikit-learn, a python library used for machine learning.

You will need a python environment with all the libraries from `requirements.txt` installed to run the code.

Instructions:

1. Implement a persistent model to be used as a benchmark: D-7 = D in the file `persistance_model_TODO.py`.
2. Implement a linear regression model from the Python scikit-learn library in the file `MLR_point_TODO.py`.
3. Implement a Gradient Boosting Regressor (GBR) from the Python scikit-learn library in the file `GBR_point_TODO.py`.
4. Implement a Gradient Boosting Regressor (GBR) from the Python scikit-learn library and change the loss function to produce quantiles in the file `GBR_quantile_TODO.py`.
5. Compare the results of the last three method with the simple persistent model. You can use `score_comparison.py`. Explain these results.
6. Add some inputs to the machine learning methods to make them more efficient in `utils.py`.
7. Perform the visual inspection of point forecasts, compare them to the realizations. Compare the different algorithms.
8. Try to optimize the GBR hyper-parameters to minimize the error. Explain briefly your methodology.
9. Change the random parameter to build a new pair of learning and testing sets. How do the scores behave? Comment the results then discuss the validation strategy. Would it be possible to adopt another strategy? What would be the pros and cons?

The assignment should again be carried out by groups of two students and submitted as a zip file on eCampus before November **December 5**, 23:59. The zip should contain a report describing your process, results, and analyses (maximum **5** pages) and your modified python files. You will have to present your work on **December 7**.

For questions and remarks, please contact tstegen@uliege.be