Part B - Time Series Analysis

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1 Introduction

This quick article contains a review of the paper *Short-term Electricity Load Forecasting with Time Series Analysis* [1]. Let us first present the main findings and then discuss the methodology together with the limits of the study.

2 Summary of the findings

As the title suggests, the paper studies the short-term (less than 2 weeks) forecast of Electricity Load using Time Series Analysis.

More precisely, they compare the performance of a standard auto-regressive process of degree 2, to the ones of what are called Seasonal Auto Regressive Integrated Moving Average processes (SARIMA). After the removal of the trend, seasonality and cyclical component, each model estimates the evolution of electricity load for 6 days based on more or less data. (from 1 week to 1 year).

The analysis suggests an optimal prediction when the model uses between 3 and 8 weeks to infer the result.

3 Discussion

3.1 Interest

As described in the paper, with the recent development of the Smart Grid, there is a huge need of new predicting tools that take into account that an electric load can be negative. (due to the presence of alternative sources of energy that are not always available)
The described method allows a better prediction and thus has both an environmental and an economical positive impact.

3.2 Methodology

The authors of this article have based their study on a well-known method to model the time series and, in that, there isn't much originality.
However it was interesting that they identified and estimate two different types of seasonal components: the one within a year and the one within a day.

Concerning the reproducibility, they gave access to the dataset and the methodology is explicit enough to allow an identical reproduction of the work.

3.3 Limits and possible improvements

First of all, the results section is not detailed enough and it could have been interesting to develop the following points:

- the evolution of the performance (MAPE, MAD and MSD factors) with respect to the date length and what it concretely means about the evolution of the loads.
- more details about the choice of models depending on the date length: why is this model better in this situation? how does each model perform for which date length? and so on.

Concerning further work to do, here are a few propositions:

- consideration of a monthly seasonal component: does it improve the model?
- consideration of other models such as ARIMAX [2]

References

[1] *Short-term Electricity Load Forecasting with Time Series Analysis*, Hung Nguyen and Christian K. Hansen, 2017 IEEE International Conference on Prognostics and Health Management.

[2] *Time Series Analysis: with Application in R.*, J.D. Cryer and K.S. Chan (2008), 2nd edition.