Electricity Demand Prediction

The goal of this homework is to develop a method to predict the electricity load demand of different individual users. The final intention of the predictions will be to use them to efficiently and reliably supply energy to these users (to be discussed in the next homework).

You are given separate datasets for 3 users that contain the detailed load demand (in kW) for each 30-minute interval and hourly weather dataset that covers 1 year. Your objective is to utilize existing prediction methods or create your own that uses the past load demand and weather data before a particular timeslot as the input to predict the next hour and 24 hourly intervals from and including this timeslot. Note that you need to predict for two different intervals (the next hour and one full day ahead).

The accuracy of the predictions will be measured by the Mean Absolute Error (MAE) [1] individually for each step ahead into the future. One baseline method to compare the accuracy to is the Naïve method [2] which simply uses the last observed value as the prediction for all steps into the future. The Naïve method is used to decide whether or not to even consider using a proposed method. Your method ought to be more accurate than the Naïve method.

Items that may want to be taken into consideration with predicting any particular household's load demand:

- Cyclical patterns: daily, weekly, climate seasons.
- Detecting a sudden temporary or permanent change in pattern (e.g. holidays, or the whole family goes on vacation).

In your report, please discuss in details how you separate the data, what models you have tried, how you diagnose the models, and other details in addition to your prediction accuracy data.

References:

[1] https://en.wikipedia.org/wiki/Mean_absolute_error

[2] https://en.wikipedia.org/wiki/Forecasting#Naïve_approach