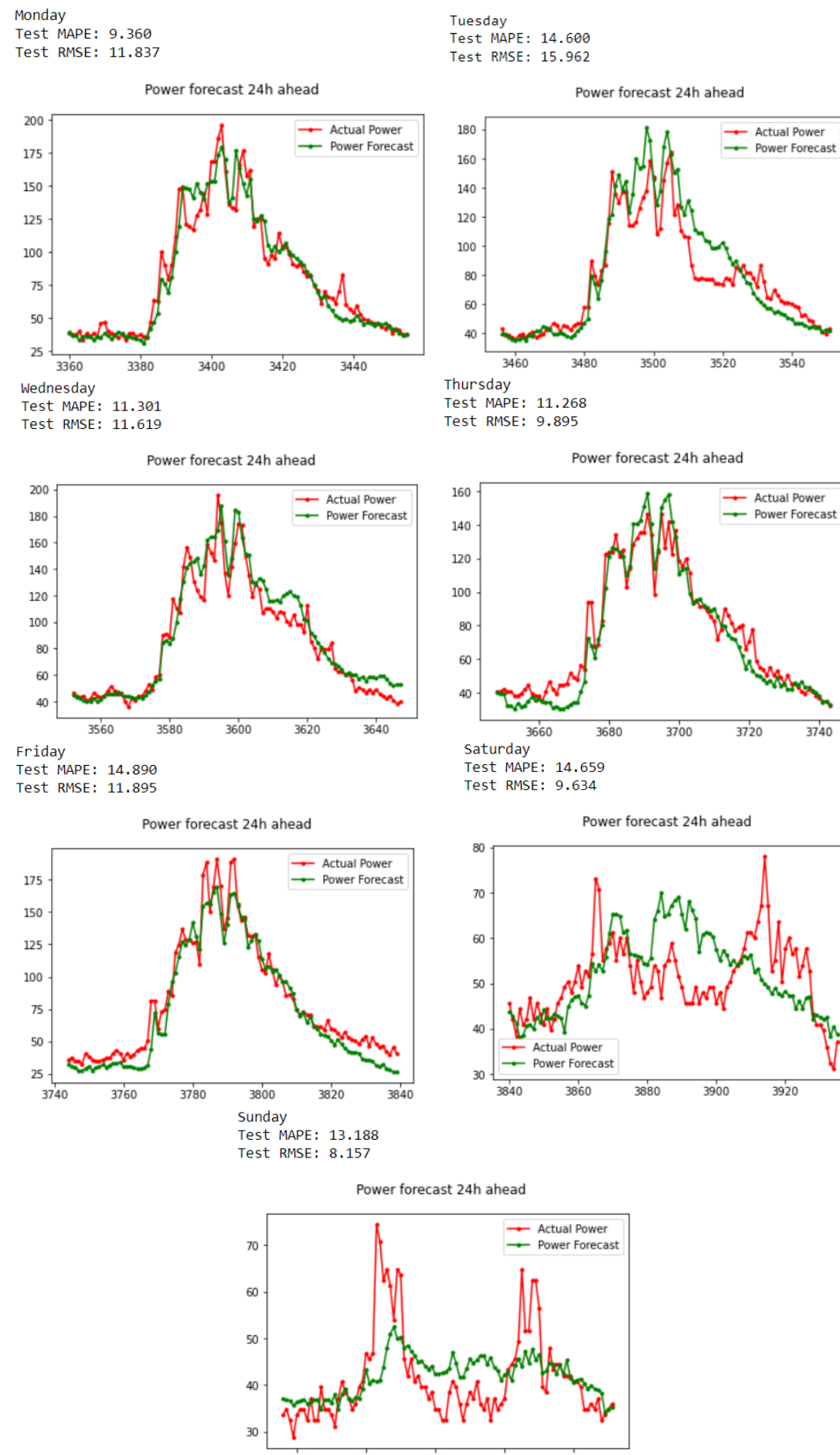


Master-Thesis Engineering, Energy and Environment

Comparison of forecasting strategies for application in V2X



Problem statement

This paper is a part of a bigger project, where a start-up is working on an algorithm which will compute an optimal schedule to combine self-consumption and peak-shaving based on historic consumption/production data and historic weather forecasts with EVs and stationary batteries.

The goal of this paper is to benchmark state-of-the-art methods for forecasting electricity demand for SMEs across different training window sizes and datasets in an explorative way, thereby revealing potential shortcomings. The models chosen are Autoregression (AR) and Holt-winters Exponential Smoothing (HWES), two classical regression forecasting techniques and a more advanced Recurrent Neural Network, a Long Short Term Memory Network (LSTM). The forecasting horizon is chosen at 96-time steps ahead (24 hours). The models are tested using two differ-

ent strategies, the Day Type Strategy and the Series Strategy. The evaluation is based on two data sets containing power consumption of SMEs.

Results

The results show that predicting accuracy is similar for all of the chosen models. The best results are achieved by the LSTM and AR model with a MAPE of 11.3%. In the Image above a weekly prediction for the HWES model can be seen.

Model	Results
AR	<p><u>Data set 1</u></p> <ul style="list-style-type: none"> MAPE 11.3% (prediction accuracy 88.7%) <p><u>Data set 2</u></p> <ul style="list-style-type: none"> MAPE 15.7% (prediction accuracy 84.3%)
HWES	<p><u>Data set 1</u></p> <ul style="list-style-type: none"> MAPE 11.9% (prediction accuracy 88.1%) <p><u>Data set 2</u></p> <ul style="list-style-type: none"> MAPE 11.7% (prediction accuracy 88.3%)
LSTM	<p><u>Data set 1</u></p> <ul style="list-style-type: none"> On ordinary: MAPE 11.3% (prediction accuracy 88.7%) On vacation: MAPE 15.1% (prediction accuracy 84.9%)

Sacha Christen

Expert:
Dr. Antonios Papaemmanouil
Prof. Dr. Thierry Prud'homme

Cooperationpartner:
Dr. Sandro Schopfer