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Electrical Load Curve Prediction for Non Residential Customers Using Bayesian Neural Networks

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We explore several statistical learning methods to predict individual electrical load curves using customers' billing information. We predict the load curves by searching in a catalog of available load curves. We develop three different strategies to achieve our purpose. The first methodology relies on estimating the regression function between the load curves and the predictors (customers'variables), using various feedforward neural networks. The predicted load curve is then searched by minimizing the error between the estimation and all the load curves available. The second and the third methodologies rely on dimensionality reduction on the curves using either an autoencoder or wavelets. We then apply deep feedforward neural networks, Bayesian neural networks and deep Gaussian processes to estimate the regression function between the reduced load curves and the predictors. In the second methodology, we search for the load curve by minimizing the error between the estimation and all the reduced load curves available in the catalog. In the third methodology, however, we reconstruct the load curves using the estimated reduced curves, and then we search for the predicted curve as in the first methodology. We implement the methods mentioned above on a use-case from EDF concerning the scaled electricity consumption of non-residential customers, aimed at correctly predicting hours of sunlight so as to size the customers'potential photo-voltaic installations.

Keywords

Autoencoders ·Bayesian analysis ·Deep learning ·Dimen- sionality reduction ·Load curve forecasting ·Solar output generation ·Transfer learning.

Classification

Both methodology and application

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