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Automated Supervision and Validation of On-Site Consumption Data at TU Dortmund University

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We present an automated script, which controls the meter readings for electricity, water, heat and cold at TU Dortmund University, Germany. The script combines historic and current consumption data and calculates individual forecasts for every meter. These one-step-ahead forecasts are compared with true values afterwards to identify deviation from the regular energy consumption or anomalies. The script also detects missing values, which indicate that the meter is not working (correctly), or the connection is lost and some other special cases. The goal of our script is to detect errors in the meter system automatically and faster than by hand. We compare the daily values with our forecasts to identify anomalies, i.e. meters with high electricity, water, heat or cold consumption. This will help to reduce the workload for the facility management and the waste of energy and thus makes the university more sustainable and efficient.
To this end, we compared multiple methods with respect to forecast accuracy and computing effort: a basic linear model, generalized additive model with spline based smoothing, SARIMA model with a seasonal period of seven, Holt-Winters additive-seasonal model, Regression with SARIMA errors (SARIMAX), and Random Forest. Holt-Winters and SARIMAX turned out to be the 'best'models and were implemented. In addition to monitoring and prediction, we thereby also identify important features effecting the consumption.

Type of presentation

Poster

Primary author: FESCA, Felix (TU Dortmund University)

Co-author: PAULY, Markus (TU Dortmund University)

Presenter: FESCA, Felix (TU Dortmund University)

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