Machine Learning Applications in Energy Systems - A Python Framework

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Energy Time Series

Titleimage source: https://wallpaperaccess.com/europe-night
Machine Learning Applications in Energy Systems

- Pattern Recognition
- Post-Processing
- Forecasting
Machine Learning Applications in Energy Systems

Detecting typical load profiles

Forecasting

Post-Processing
Machine Learning Applications in Energy Systems

![Graph showing national demand (kWh) over time of day for different types of day.

- Normal Weekday
- Normal Weekend
- Proximity Day
- Special Day

The graph illustrates the variation in national demand throughout the day for different types of day, highlighting the differences in energy consumption patterns.]
Machine Learning Applications in Energy Systems

- Pattern Recognition
- Post-Processing
- Probabilistic demand forecasts
Machine Learning Applications in Energy Systems

[Graph showing national demand (kWh) from July to September with varying trends and patterns.]
Machine Learning Applications in Energy Systems

Pattern Recognition
- kMeans
- eSAX
- Outlier Detection

Post-Processing
- EMOS
- Feature Selection
- Trend removal

Forecasting
- Neural Network
- Linear Regression
- Deep Networks

Trend removal

Feature Selection

Outlier Detection

Deep Networks

Linear Regression

Neural Network

Pattern Recognition
Python Framework

Energy Time Series

Pre-Processing

Forecasting

Visuals

Output

Pattern Recognition

Post-Processing

Visuals
Python Framework

Energy Time Series → Pre-Processing → Forecasting → Visuals → Output

Pattern Recognition

Post-Processing

IAI - ML4Time
Add modules to pipeline
- Internal data structure xarray
- Store pipeline in json file to access later
- Store modules and parameters in pickle
- Write your own modules
Summary

- Lots of possibilities for machine learning in energy systems

- We’re working on a new Python framework to make energy time series analysis especially machine learning easily available and reproducible

- We’re looking for a name for our Python framework!

- Any ideas what we should include? Want to collaborate?
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