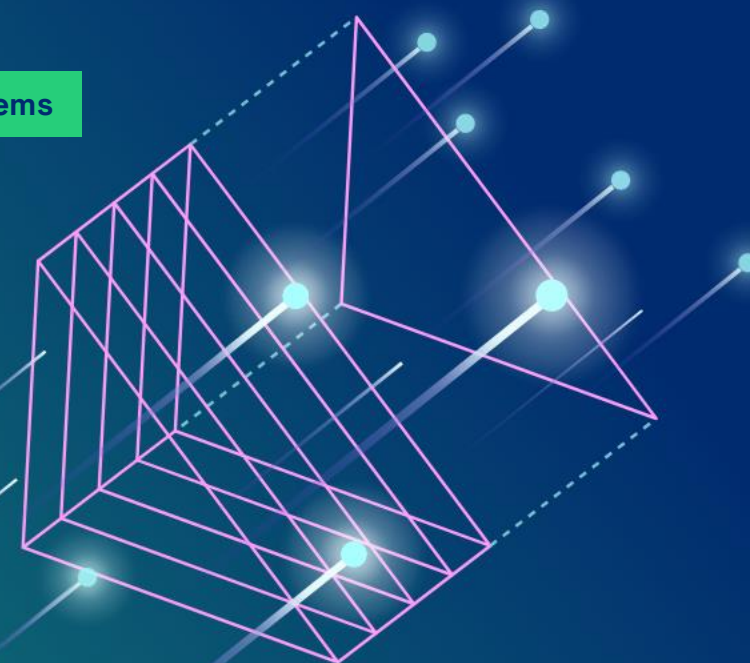


Leveraging on big data management and AI to deploy consumer-centric smart energy systems

Experience and insights from I- ENERGY as a bridge between AIoD and Big Data Analytics

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UNDER THE AUSPICES OF



I-ENERGY Vision

Deliver an energy-specific **open modular framework for supporting AI-on-Demand in the energy sector (AI₄ Energy)**

Based on state-of-the-art AI and Data technologies



Energy Commodities Networks: AI for energy networks optimised operation



Distributed Energy Resources: AI for RES generation, buildings, districts, communities



Energy Efficiency and Non-energy related Services: AI enabling synergies / implications on other energy and non-energy domains

I-ENERGY use cases and main stakeholders

Use cases

- AI for network assets' predictive maintenance, integrating off-grid data with condition-based monitoring
- AI for network load forecasting towards efficient operational planning
- AI-based consumption and flexibility prediction for local community optimal aggregation and flexibility trading
- AI-based IoT-enabled PV module-level portfolio optimal predictive maintenance and PV-enhanced industrial plant optimal operation
- AI in EV charging infrastructure
- AI for peer-to-peer renewable energy trading in virtual energy community
- AI for the Ambient Assisted Living (AAL) and personal safety/security at home
- AI for de-risking energy efficiency investments

Beneficiaries



- TSOs
- DSOs
- Aggregators
- Energy communities
- Citizens

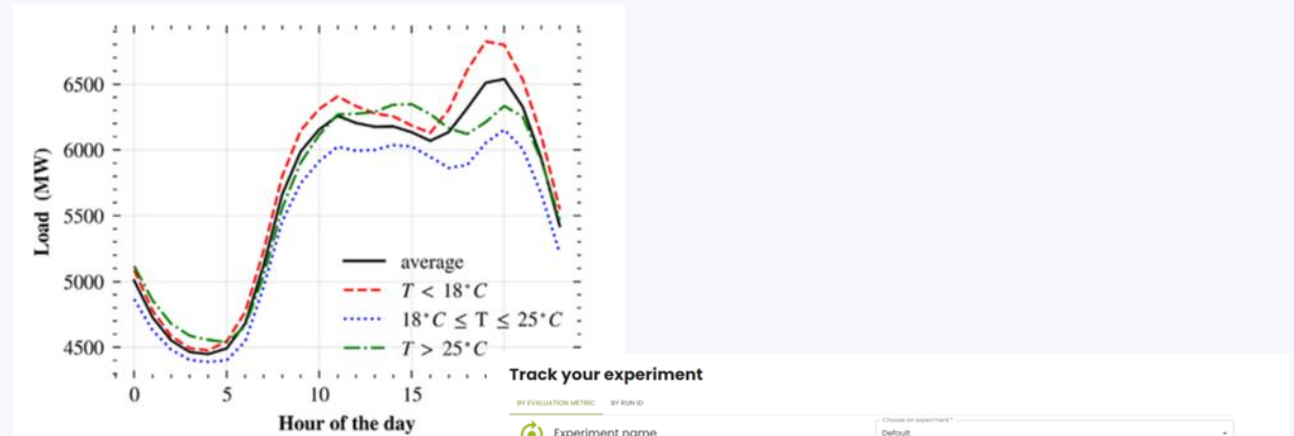
I-ENERGY Indicative Services

Load Forecasting Service (DeepTSF)

A comparative assessment of deep learning models for day-ahead load forecasting: Investigating key accuracy drivers, 2023, Sustainable Energy, Grids and Networks

Holistic / extendable time series forecasting service

- Mass execution of deep learning experiments through an automated and codeless framework for data scientists.
- Multivariate and multiple time series forecasting
- Ability to monitor the high-level forecasting results and experiments.
- Provides a user-friendly interface that supports multiple roles
- Mainly used for load forecasting



Track your experiment

BY EVALUATION METRIC BY RUN ID

Experiment name:

Main evaluation metric:

Number of evaluation samples:

Figure 4: DeepTSF experiment tracking page.



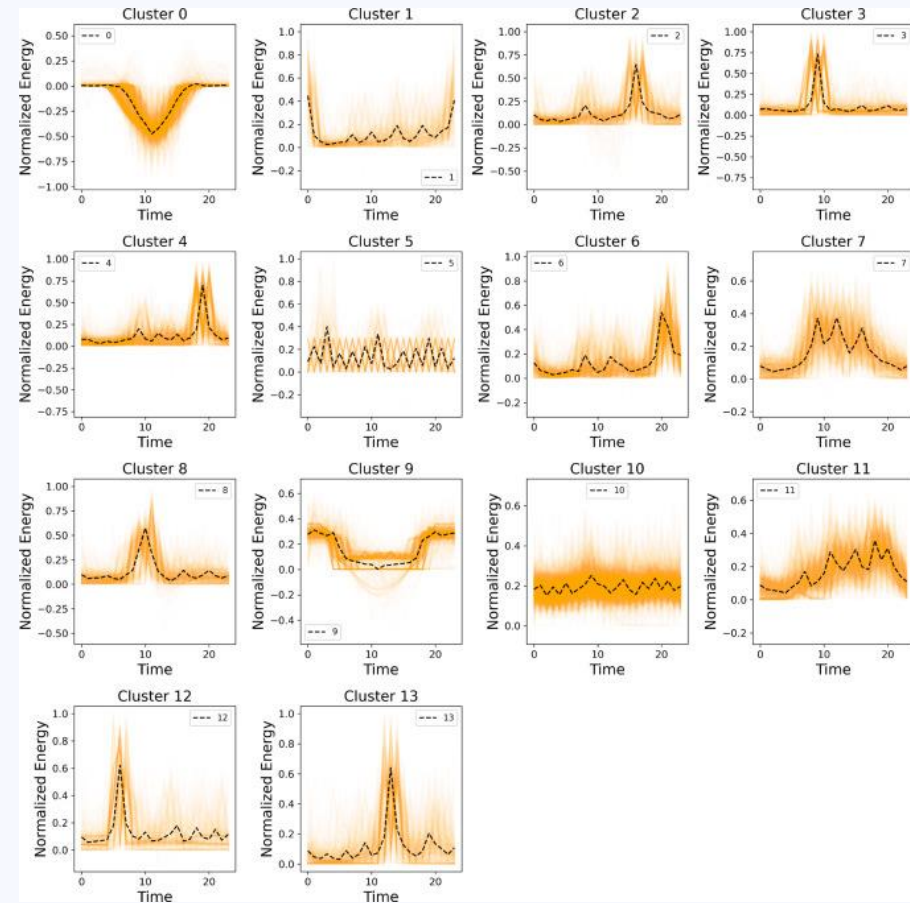
(a) Evaluation metrics of the selected model for inspection. (b) Line plot of the forecast versus actual time series. Figure 5: DeepTSF experiment tracking and evaluation page results.

DeepTSF: Codeless machine learning operations for time series forecasting. arXiv preprint arXiv:2308.00709 (2023).

Flexibility Forecasting and Demand Response Service (FlexDR)

Provides targeted recommendations to prosumers to reduce reverse power flow in the electrical distribution grid

- Short Term Load Forecasting
- Timeseries clustering
- Recommendation engine



Targeted demand response for flexible energy communities using clustering techniques. Sustainable Energy, Grids and Networks, 2023, 36: 101134

Energy Efficiency Investments Decision Support for Buildings Service

Provides AI-based decision support for the selection of alternative energy efficiency investments in buildings

- Used for Riga Multifamily buildings
- Proposes specific renovation actions based on the building characteristics

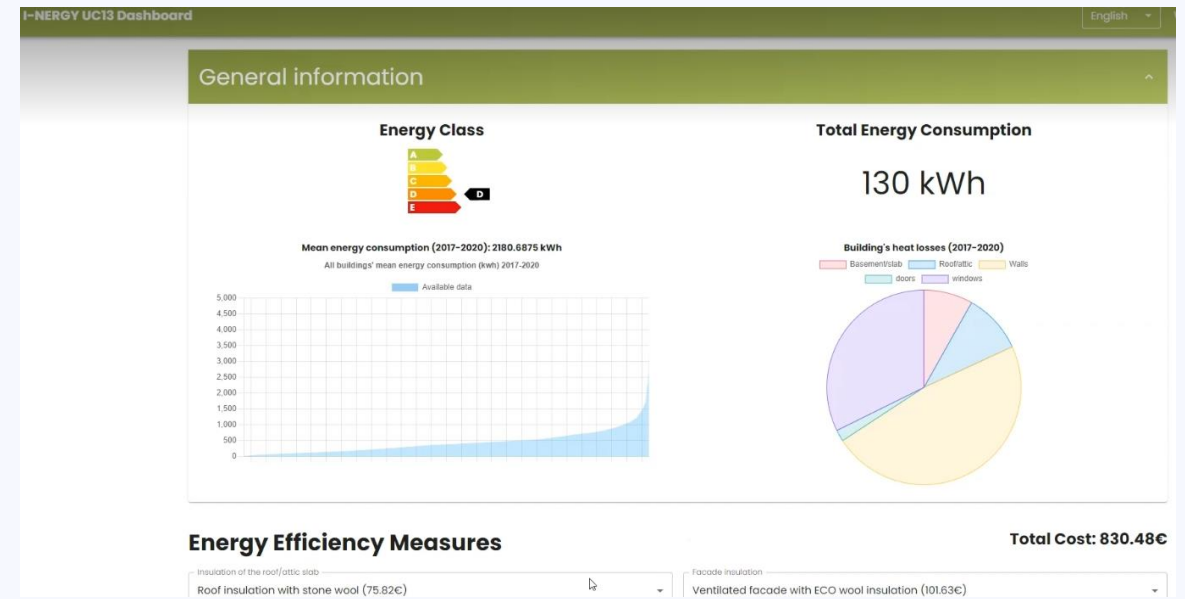

Energy Efficiency Investment De-Risking

Configuration

Select Building Address
Fill in the dropdown menu with the proper address to open the map.

Building Materials
Select heavy (solid brick, hollow reinforced concrete panel) or light (wood and wooden) building materials. Heavy building materials Light building materials

Choose a resembling photo
Select the image that looks like your building the most. In this way, the system will understand its characteristics.



I-ENERGY and AloD Platform

The majority of I-ENERGY services is available on AloD Platform

- Several I-ENERGY AI models have been onboarded to AloD Experiments platform
 - They can be easily downloaded and deployed to a local environment
- I-ENERGY services and assets are also available on AloD Catalog.
 - Source code
 - Documentation
 - Datasets
 - Notebooks

I-ENERGY services have gained significant popularity through AloD platform in terms of data as well as applications on different use cases and other datasets.

Thank you!

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