ML@GridEdge

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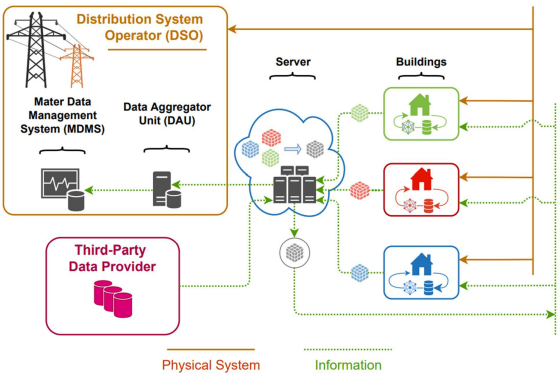
Motivation and Objective

- Tomorrow's energy communities and the resilient operation of the energy infrastructure hinges on accurate **prediction of buildings' temporal net energy demand**.
- **Traditional prediction** models primarily leverage historical information (such as net energy demand) at the grid or building level.
- The **ML@GridEdge** project intends to develop a novel distributed machine learning model for predicting the temporal net energy demand of future connected communities.
- The proposed multi-agent approach leverages centralized oversight of a central server to manage **distributed collaboration** among each building, and takes advantage of additional **private information** that is not shared with the server.

Approach

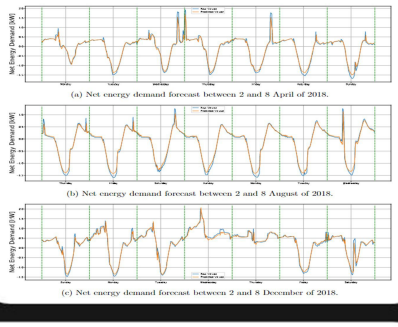
- A novel **federated learning (FL) model** is used for predicting building net energy demand.
- Use of the **private data** at the building level without the need of sharing such data.
- Two **independent systems** are used to forecast generation and demand.
- **Third-party** data provider to the weather data.



Scenarios

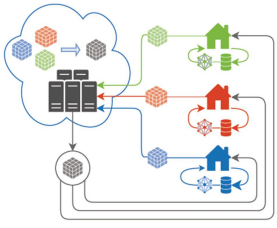
- First, simulated with data from 6 buildings on a **University campus**.
- Larger scale simulation using a dataset with 600 **residential buildings** in California.
- Buildings with and without **PV generation**.
- Several features associated **with demand and generation** (e.g. weather data, area of the building, year of construction, the capacity of the PV system, etc).

Results



Conclusions

- Better results with **2 independent models** for generation and demand;
- Capability of learning enhanced by **different profiles**;
- Faster learning process in **new communities**;
- FL enables the **increase of prediction reliability** when compared with traditional models.



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