Lehrstuhl Steuerung, Regelung und Systemdynamik

Master Thesis

Literature research, Programming and Simulation

Time series generative pre-trained transformer (TimeGPT) based modeling of general energy consumption in residential sector

Keywords: Energy consumption, renewable energies, community

Conditions:

Duration:	6 months
Requirements:	Strong programming knowledge
Language:	English
Target group:	Master students

Contents:

In recent years, there has been a growing global interest in renewable energy, such as solar and wind, driven by concerns about climate change, air pollution, energy security, and the desire for sustainable and clean energy alternatives. Because of this, an increasing focus appeared for understanding how consumers make decisions related to energy consumption, and the factors influencing consumers choices.

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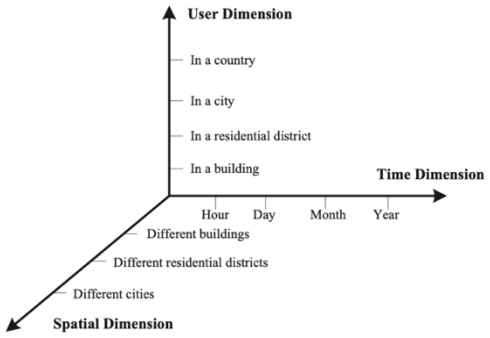

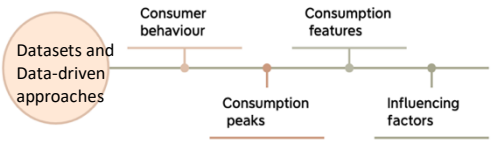

In this work, the primary objective is to employ time series generative pre-trained transformer (TimeGPT) methods to develop models that represent residential comsumption under different levels (buildings, districts, cities). These models simulate how these consumers make decisions regarding their energy consumption through the time. The goal is to develop generalizable models by adressing the key factors that influence energy consumers within the community, which may include economic considerations, weather conditions, and social influence. The focus to solve the mentioned problem in this work will be by using machine learning approaches. The student must passed the Machine Learning exam (by Prof. Söffker).

The goals/steps of this work are:

- Based on literatur review: Defining the different existing research, theories, and models related to general consumer behavior in community systems
- Based on literature review: Refining the different features for energy consumers in communitiess
- Determining data requirements for the simulation (may include data on energy loads, consumer demographics, energy prices, policy incentives, market dynamics, etc.)
- Generating methods and models using TimeGPT to adress the problem
- Simulation and comparison of the methods in the propper simulation environment
- Evaluation and validation of the developed methods using real datasets

Complete and detailed documentation/presentation of the research results

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