Chair of Renewable and Sustainable Energy Systems
TUM School of Engineering and Design
Technical University of Munich

TUM

IDP, Research Internship

Need for Speed: Optimization and Integration of HAMLET

Background

Our chair is researching energy systems with different levels of granularity ranging from continent-wide models to buildings. However, simulating nation models differs strongly from simulating distribution grids. The simplifications that are made for bigger models do not hold any longer for such a fine resolution. For this reason, we have developed a new tool called HAMLET, which uses agent-based modeling. Agent-based models have the advantage that they can depict many more details than the optimization models that we use for our national and continental models. This way, we can model, for example, different behaviors of each household, i.e., agents, as well as different market designs or forecasting methods. The downside is that these models also require a lot more computing power due to their increased complexity. For this reason, we are looking for motivated informatics students who help us both with improving the tool's speed as well as integrating the tool in our chair environment as we are simultaneously working on creating a data platform that helps researchers all over the world to find the right data for their models. If you want to apply your acquired computer science skills for the energy transition, feel free to contact us!

Goals

- Identify bottlenecks, reduce runtime, and improve efficiency without compromising the accuracy, robustness, or the outcome of the simulations
- Integration of the tool into the chair's tool and data environment

Requirements

- Good programming skills in Python
- Good command of Git (GitHub or GitLab)
- Knowledge about data management is helpful
- Knowledge about energy economics is helpful but not crucial

Learning outcomes

- Application of learnt computer science know-how in the realm of energy system modeling
- Becoming proficient in the entire process of software optimization and integration
- Hands-on software engineering in the following areas: profiling, code analysis and refactoring, library management, data handling, memory management, code compilation, review and documentation

Contact

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