



Bachelor Thesis

Reviewing the Application of Machine Learning (ML) in Energy Economics

Methods from econometrics and operations research belong to the toolbox of any energy economist all along. However, a notable increase of disposable data, as well as recent advances in Big Data and computational power offer a wide range of new promising approaches that can potentially add value to energy economic research. These are Artificial Intelligence (AI) and Machine Learning (ML). In theory, ML can replace or complement traditional data analysis and forecasting models in many ways. Among others, they offer new approaches for risk management, the analysis of macroeconomic and energy trends as well as the forecasting of energy prices or energy demand by applying concepts such as Support Vector Machines, Artificial Neural Networks, or Ensemble Learning.

Against this background, the goal of this Bachelor Thesis is to conduct a thorough literature review on ML approaches to numerical and empirical energy economics. Thereupon, the findings shall be used for analyzing opportunities and deficiencies of ML techniques, and applications where they outperform traditional approaches, such as econometric or optimization models. Subsequently, the resulting insights shall be utilized for evaluating the expediency of ML in energy economics. ML techniques by themselves are not a panacea. Therefore, also special attention must be paid to thoroughly weigh benefits and promises against disadvantages and possible drawbacks. Finally, the thesis should include a discussion on where ML techniques underperform and where hybrid models (traditional models combined with ML) might offer new opportunities. This does not simply involve reviewing existing approaches but giving an outlook on technological advancements and their accompanying implications for data analysis and forecasting models in the energy sector.

Key tasks and objectives of the thesis

- Literature Review
- Clear structured handling of the contents

Your profile

- Study of energy economics
- Interest in machine learning (first experiences in this field are a plus)

Literature

- Ghodduzi, H., Creamer, G. G., & Rafizadeh, N. (2019). Machine learning in energy economics and finance: A review. *Energy Economics*, 81, 709-727.
- Banik, R., Das, P., Ray, S., & Biswas, A. (2020). Prediction of electrical energy consumption based on machine learning technique. *Electrical Engineering*, 1-12.

Contact



Contact

Tel.: +49 221 27729-115

E-Mail:

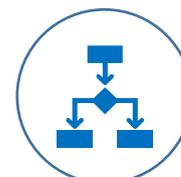
arne.lilienkamp@ewi.uni-koeln.de

Topics



- Machine Learning
- Energy Economics

Methods



- Literature Review