University of Stuttgart
Germany

Institute of Combustion and Power Plant Technology
Univ.-Prof. Dr.-Ing. Hendrik Lens

Announcement

Bachelor Thesis

Literature Review of Informed Search Methods for Power Systems: Leveraging Machine Learning Techniques

→ *Also available in the scope of a 'Studienarbeit' or Master Thesis*
→ *Multiple students can work on this topic in parallel*

Background

The increasing share of volatile renewable generation in the power system creates challenges for the efficient operation and planning of power generation and distribution. For a lot of these challenges, optimization algorithms are used to find solutions that maximize economic viability subject to technical constraints. Examples are optimal generation scheduling, redispatch, grid expansion planning, and demand side management. Because of the complexity and scale of the power system, traditional optimization algorithms are computationally expensive and cannot give guarantees that globally optimal solutions are found, which might lead to suboptimal decisions impacting the power system. Informed search methods can help to avoid this. They use domain-specific knowledge to guide the search process towards global optima while efficiently using computational resources. With the recent developments in Machine Learning (ML) and Artificial Intelligence (AI), new informed search algorithms have been created (as the training of AI and ML algorithms can be seen as similar optimization problems). In this thesis, special attention should go to these new algorithms.

Objective

In this research project, you will explore different informed search methods and power system applications for which they can be applied. This can possibly lead to new approaches to solving relevant problems in the energy transition. You will learn about both informed search algorithms and power system optimization.

Approach and tasks

1. Literature review on informed search methods
2. Literature review on power system optimization problems
3. Discussion and matching of informed search methods with power system optimization problems
4. If applicable: implementation of the informed search methods on an example system

Requirements

- Independent work style
- Basic knowledge of linear algebra and programming

Start date: flexible

Interested students please contact
M.Sc. Johannes Lips   johannes.lips@ifk.uni-stuttgart.de
M.Sc. Benedikt Jahn   benedikt.jahn@ifk.uni-stuttgart.de
Dept. Power Generation and Automatic Control   Phone 0711/685 67798, Room 0.54

Examiner: Univ.-Prof. Dr.-Ing. H. Lens

IFK, Pfaffenwaldring 23, 70569 Stuttgart
www.ifk.uni-stuttgart.de/lehre/angebot/studentische-arbeiten/

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