Probabilistic Graphical Models for Energy Systems | PROGRESS

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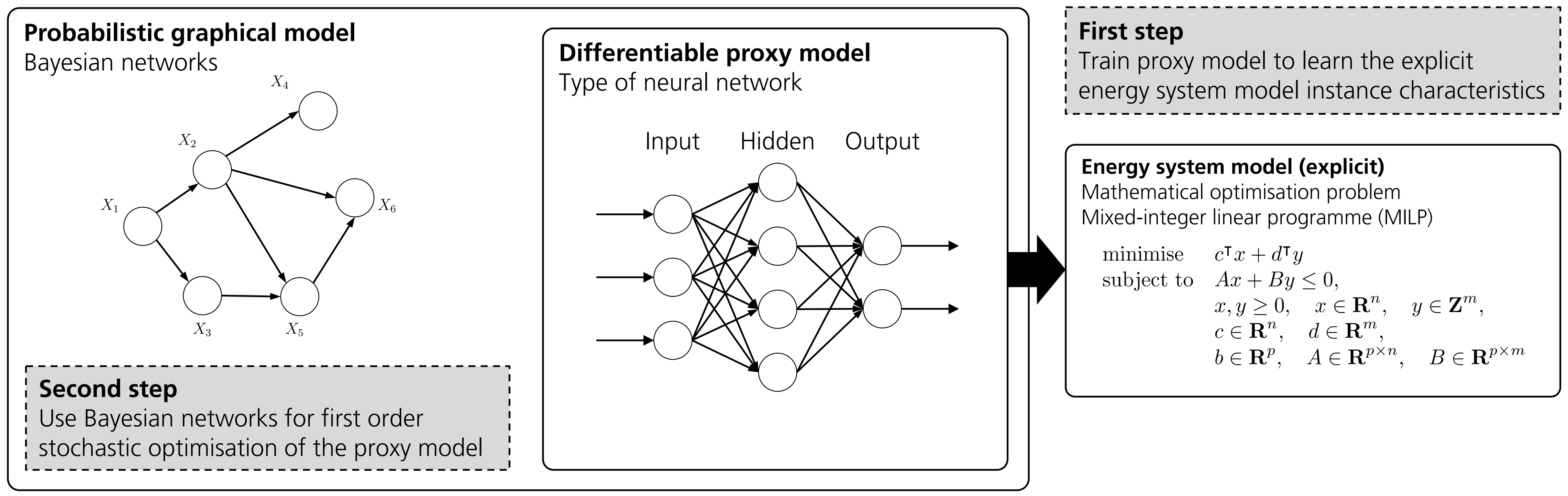
Introduction

Making investment and operational decisions in modern low-carbon energy system environments is characterised by a multitude of interactions and uncertainties. Supporting the underlying decision-making processes in the industry and public domain requires the application of sophisticated energy system analysis tools. The project contributes to the development of new methods in the energy system analysis field that can cope with increasing complexity and uncertainty.

Objectives

- Develop and use probabilistic graphical models as a fundamentally new approach for planning energy systems under uncertainty of both in- and output data
- Design innovative, highly scalable optimisation methods for target platforms using artificial intelligence methods with the possibility of massive parallelisation
- Comprehensive assessment and visualisation of uncertainty relationships between input and result data by determining a posteriori probability and a priori distributions (probabilistic inference) to reduce the "research bias"
- Identification of suitable use cases in the context of energy and finance
- Open source tooling of the underlying modelling and optimisation framework.

Core idea of the new modelling and optimisation approach



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PROGRESS combines cross-disciplinary expertise and develops innovative methods for the holistic consideration of uncertainties in planning problems of energy systems.

New framework allows for differentiable solver implementations through proxy functions that have already shown promising results in computer vision applications.

Flexible target computational platforms and solvers specialised on individual optimisation problems help to deal with the increasing complexity and uncertainty of energy systems.

The use of probabilistic inference enables the relationships between input data and effects in energy system planning problems formulated as graphical models to be investigated more closely.

SYSTEMANALYSE
FORSCHUNGSNETZWERKE ENERGIE

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