

Robustness analysis for reinforcement actions in distribution grids

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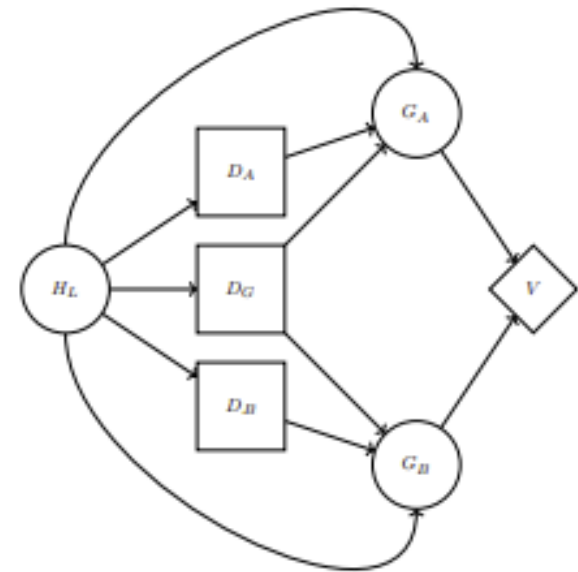
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Työn saa tallentaa ja julkistaa Aalto-yliopiston avoimilla verkkosivuilla. Muilta osin kaikki oikeudet pidätetään.

Background 1/2

- The distribution system operator seeks to protect distribution grids from external hazards
- The aim is to maintain grids' reliability while minimizing the reinforcement costs
- The problem is represented as an influence diagram



De La Barra, J., Salo, A. 2023. Selecting combinations of reinforcement actions to improve the reliability of distribution grids in the face of external hazards. ESREL2023.

Background 2/2

- Cost-efficient reinforcement actions for specific parameters are found using Portfolio Decision Analysis (PDA)
- Impacts of the hazards are not known precisely
- Impacts of the reinforcement actions are uncertain

Objective

- Sensitivity and robustness analysis
 - How does the reliability of the grid depend on model parameters
 - How big a change will cause the reinforcement actions to change.

Limitations

- A compact system with two grids and three different hazards
- Only the impact of changing the effectiveness of reliability actions and hazards will be studied

Literature

- De La Barra, J., Salo, A. 2023. Selecting combinations of reinforcement actions to improve the reliability of distribution grids in the face of external hazards. ESREL2023.
- Salo, A., Andelmin, J., Oliveira, F. 2021. Decision programming for mixed-integer multi-stage optimization under uncertainty. European Journal of Operational Research 299 (2022), pp. 550-565.

Methods

- Julia package "DecisionProgramming.jl" for multi-stage decision problems
- Python interface for sampling different scenarios and solving the problem with different inputs

Schedule

- Presentation of the topic 16.6.2023
- Studying the literature and the Julia package 6/2023
- Analysis and writing the thesis 7-8/2023
- Presentation of the results in the seminar 9/2023