technische universität
dortmund

Seminar: Monte Carlo Simulations: Theory and Practice

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Introduction

Newly designed seminar started from SoSe 2024.
Seminar Structure:

- Theoretical Instruction & Practical Examples
- Project-based Learning
- Group Implementation of Algorithms
- Report Writing and Presentation

- Language: English
- Seminar Duration: [12 weeks (8 weeks instruction + 4 weeks presentation)]
- Class Timing: [Wednesday 10:15 - 11:45 (tentative)]

Target student group: Master of Statistics (MS 4), Master of Data Science (MD 4), and Master of Econometrics.

Prerequisite: None. However, it is highly recommended that students have a fundamental understanding of probability theory and Bayesian theory, as well as fundamental programming skills in R or Python.

Topics of the seminar

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- Random Number Generators
- Sampling Methods
- Variance Reduction Techniques
- Monte Carlo Integration
- Bootstrap Methods
- Markov Chains
- Markov chain Monte Carlo (MCMC Sampling)
- Hamiltonian Monte Carlo (HMC)

Literature:

- Christian P Robert, George Casella, and George Casella. Monte Carlo statistical methods, volume 2. Springer, 1999.
- Reuven Y Rubinstein and Dirk P Kroese. Simulation and the Monte Carlo method. John Wiley & Sons, 2016.