

Comparison of optimal experimental design criteria in engineering applications

Student research project / Master thesis

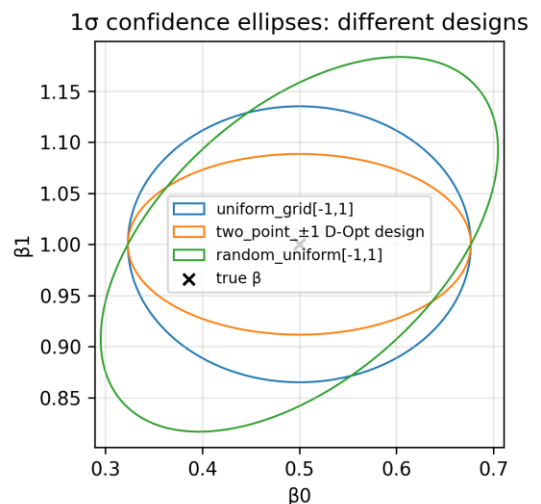
Advances in sensor technology and data processing routines enables data acquisition in many engineering applications. Thus, in the context of digital prototyping, incorporating data to calibrate model parameters or to update the model state is a crucial task. A naive approach for data acquisition is to apply low discrepancy sequences to explore the design space. However, these techniques are unaware of the model to be calibrated. Optimal experimental design [1] (OED) in contrast searches for designs (sensor position, number of sensors) that are most informative on the parameters to calibrate. This thesis shall investigate and compare different optimality criteria that have been developed in the literature and apply them on engineering benchmark models.

Requirements:

- Basic knowledge in probability theory, preferably Bayesian inverse problems
- Good programming skills
- Willingness to perform a theoretical work with focus on simulation methods

Tasks:

- Literature research for OED approaches
- Selection and implementation of benchmarks (analytical as well as PDE based models)
- Application of OED criteria and comparison of optimal designs



[1] Huan et.al. "Optimal experimental design: Formulations and computations." 2024

Contact

Dr.-Ing. Julius Schultz
Langer Kamp 19, Raum 204
Tel: 0531 391 – 62121
j.schultz@tu-braunschweig.de



www.tu-braunschweig.de/inad