

SBI BA Thesis

Abstract.

Simulation-based inference (SBI) has become a powerful tool for analyzing complex systems, integrating synthetic computations and Artificial Intelligence methods. The latter typically leads to significant speed up of the inference in comparison to traditional Bayesian Inference, whilst the loss in precision is not significant.

This thesis aims to explore various SBI approaches, including SNRE, SNLE, and SNPE, and provide benchmark results when applied to established Bayesian models. By comparing SBI with traditional Bayesian methods, the strengths and limitations of the methodology will be identified. Furthermore, this thesis will develop novel SBI methodologies specifically tailored for ongoing projects in Epidemiology and Systems Biology.