Universität Rostock

Traditio et Innovatio

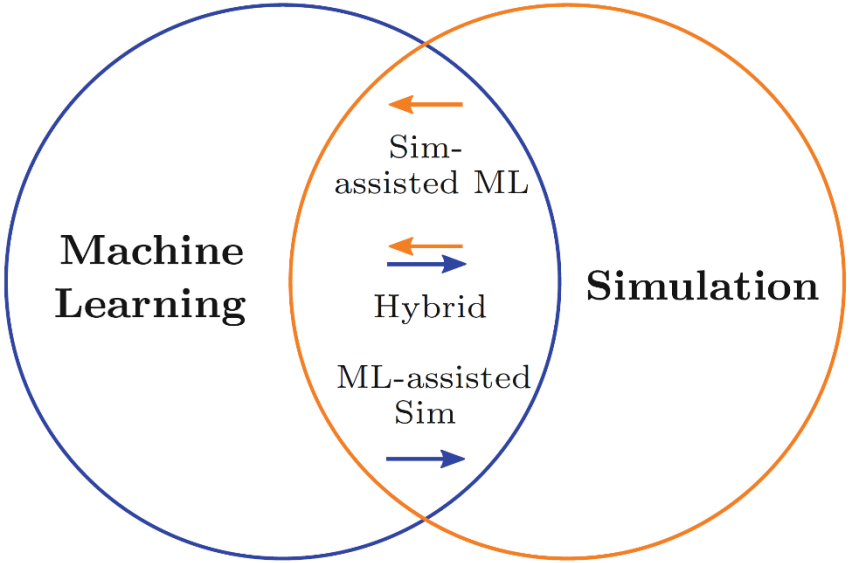
Fieldseminar

Combining Machine Learning and Simulation

Modeling and Simulation,
Institute for Visual and Analytic Computing (VAC)

Machine Learning and Simulation

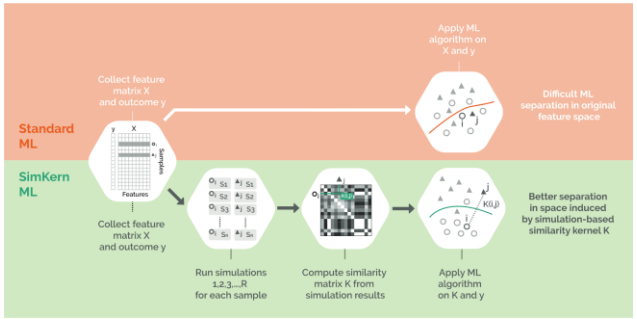
Two complementary methods



von Rueden, L., Mayer, S., Sifa, R., Bauckhage, C., & Garcke, J. (2020). Combining machine learning and simulation to a hybrid modelling approach: Current and future directions. In *Advances in Intelligent Data Analysis XVIII*. DOI: 10.1007/978-3-030-44584-3_43

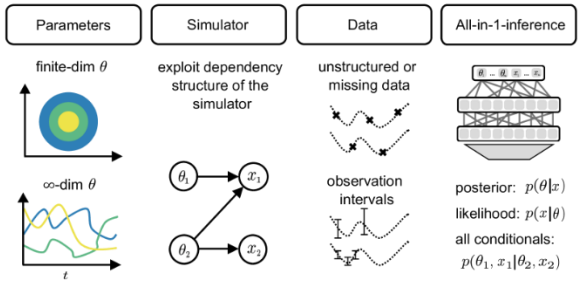
Some Example Topics

Combining ML methods with SIM methods



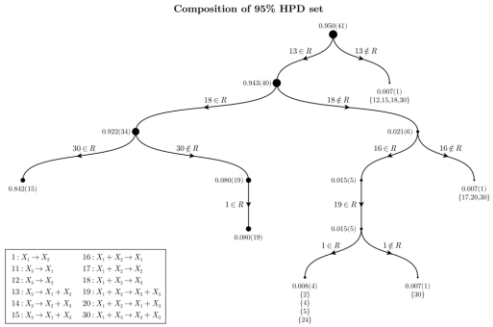
Deist, Timo M., et al. "Simulation-assisted machine learning." *Bioinformatics* 35.20 (2019): 4072-4080.
DOI: 10.1093/bioinformatics/btz199

ML for more performant Simulation



Gloeckler, Manuel, et al. "All-in-one simulation-based inference." Proceedings of the 41st International Conference on Machine Learning (2024).
DOI: 10.48550/arXiv.2404.09636

Learning Simulation Models



Foo, Yong See, et al. 2025. "Quantifying Structural Uncertainty in Chemical Reaction Network Inference." arXiv:2505.15653. Preprint, arXiv, May 21. DOI: 10.48550/arXiv.2505.15653

The full list of topics will be presented during the kick-off meeting on 13th April

Organization

- **First meeting**: Mon 13th April, 13:00 in SR 222, A.-Einstein-Str. 26 (Neubau Elektrotechnik)
- **Language**: English (or German)
- **Skills**: How to find and read papers? How to write a research article? How to give a scientific presentation?
- **Content:** Three lectures, independent reading and writing, presentation to the class
- **Contact**: Pia Wilsdorf, pia.wilsdorf@uni-rostock.de
  Anja Wolpers, anja.wolpers@uni-rostock.de
  Justin Kreikemeyer, justin.kreikemeyer@uni-rostock.de

Modalities (tentative)

The „exam“

1. **Prüfungsvorleistung**: being present in the seminar and presentations
2. **Presentation**: 20min presentation (firm!) + 10min discussion
3. **Report**: 10 pages in LNCS template; summary and discussion of your chosen paper‘s ideas and review of related work.