Bachelor / Master Theses in Federated Machine Learning

Advisor: Dr. Michael Kamp

Trustworthy Machine Learning Group
Institute for AI in Medicine, UK Essen and
Institute for Neuroinformatics, Ruhr University Bochum
http://trustworthyml.de/

The Institute for Artificial Intelligence in Medicine (IKIM) offers students a captivating opportunity to be at the forefront of innovative developments in healthcare. Bringing together researchers from various disciplines, IKIM conducts groundbreaking research that not only enhances patient care but also revolutionizes the training of future generations of doctors and AI scientists. As part of the University Medicine Essen and the University of Duisburg-Essen, IKIM provides an inspiring environment to delve into the exploration and application of AI technologies. The Trustworthy Machine Learning group at IKIM and the Ruhr University Bochum explores novel approaches for theoretically sound and practically useful machine learning. We develop new federated learning methods to improve privacy, theoretically investigate deep learning to provide guarantees on model quality, and we improve the robustness of models trained both centrally and via federated learning.

Research Topics

- Federated Learning:
    - Improving communication efficiency in learning from small datasets (paper)
    - Investigating layer-wise aggregation (paper)
    - Privacy-preserving dataset similarity via normalizing flows
- Theory of deep learning:
    - Approximating representativeness of datasets (paper)

Requirements

- Strong mathematical background
- Proficient in python, experience in PyTorch recommended

Contact

If you are interested in a thesis, please send an email including your CV and transcript of records to Michael Kamp (michael.kamp@uk-essen.de).