Title: Workshop: Introduction to Machine Learning

Instructor: Tobias Rebholz

Abstract:

This workshop covers the fundamentals of machine learning. The focus is on understanding the basic concepts and general workflow, as well as on getting hands-on experience in R with data analysis using various supervised and unsupervised learning techniques. As such, the workshop is intended for students who are just getting started and/or have some (but not extensive) prior experience in machine learning.

Topics may include (but can be adapted to participants' skill levels and interests):

- Fundamentals (e.g., prediction as primary research goal, cross-validation and hyperparameter tuning, key milestones and historical context)
- Basic supervised learning techniques (e.g., regularized regression, support vector machines, classification/regression trees, ensemble methods)
- Basic unsupervised learning (e.g., k-means and hierarchical clustering, anomaly detection) and dimensionality reduction (e.g., principal component analysis, multidimensional scaling) techniques
- Advanced topics (e.g., deep learning, semi-supervised learning, generative AI)
- Ethical and responsible AI (e.g., bias and fairness, explainable AI, trust in technology), opportunities and challenges (e.g., stimulus generation, deep fakes), and future trends (e.g., ChatGPT as participants)

Assignment: Bring your own laptop with R and the packages *mlr3verse* and *reticulate* installed.

Credits: 2 workshop days