Chair of Explainable AI-Based Business Information Systems
Prof. Dr. Ulrich Gnewuch

Bachelor's/Master's Thesis: Exploring the Impact of the Rashomon Effect on Users of XAI Applications

Supervisor: Philipp Hansen, M.Sc. (philipp.hansen@uni-passau.de)
Start date: At the next possible date

Motivation and Goals

In machine learning (ML), multiple models can achieve comparable performance when applied to the same prediction problem – a phenomenon typically referred to as 'multiplicity' (Marx et al., 2020). This multiplicity is of great significance, since each of the models may rely on different parameters and assign importance to different variables/features, giving rise to the 'Rashomon Effect' (Breiman, 2001), where explanations derived from models' predictions may diverge (Marx et al., 2020). When equally well performing models produce inconsistent results, negative effects on the user's trust in algorithmic decisions might be observed (Haghighat et al., 2026). Providing information about the predictive multiplicity to affected stakeholders, in turn, allows them to evaluate choices regarding model selection, validation and explanations (Marx et al., 2020).

In light of this, the goal of the thesis is to explore the impact of the Rashomon Effect on users of explainable artificial intelligence (XAI) applications, i.e., how users react to diverging explanations due to changes in model selection, and if providing an explanation on the Rashomon Effect yields positive effects. For this purpose, the student is expected to develop a small-scale ML application and evaluate it with users. For a bachelor's thesis, the evaluation can be done in a qualitative manner, e.g., via interviews or think-aloud sessions, whereas a master's thesis is expected to comprise a full experiment, either as a within-subject or between-subject design.

Required Skills

- Strong interest in (X)AI
- Good English skills
- Ideally, prior coding experience

Starting Literature (Topic)

Breiman, L. (2001). Statistical Modeling: The Two Cultures (with comments and a rejoinder by the author). *Statistical Science*, *16*(3), 199–231. https://doi.org/10.1214/ss/1009213726

Haghighat, P., Anahideh, H., & Rudin, C. (2026). Resolving Predictive Multiplicity for the Rashomon Set. *Proceedings of the AAAI Conference on Artificial Intelligence*, *40*(44), 37435–37442. https://doi.org/10.1609/aaai.v40i44.41076

Marx, C. T., Du Pin Calmon, F., & Ustun, B. (2020). Predictive Multiplicity in Classification. *Proceedings of the 37th International Conference on Machine Learning*, 6765–6774. https://dl.acm.org/doi/10.5555/3524938.3525566

Müller, S., Toborek, V., Beckh, K., Jakobs, M., Bauckhage, C., & Welke, P. (2023). An Empirical Evaluation of the Rashomon Effect in Explainable Machine Learning. In D. Koutra, C. Plant, M.

Gomez Rodriguez, E. Baralis, & F. Bonchi (Eds.), Machine Learning and Knowledge Discovery in Databases: Research Track (pp. 462–478). *Springer, Cham*. https://doi.org/10.1007/978-3-031-43418-1_28

Starting Literature (Method)

Charness, G., Gneezy, U., & Kuhn, M. A. (2012). Experimental methods: Between-subject and within-subject design. *Journal of Economic Behavior & Organization*, *81*(1), 1–8. https://doi.org/10.1016/j.jebo.2011.08.009

Charters, E. (2003). The Use of Think-aloud Methods in Qualitative Research: An Introduction to Think-aloud Methods. *Brock Education Journal*, *12*(2), 68–82. https://doi.org/10.26522/brocked.v12i2.38

Hevner, A. R., March, S. T., Park, J., & Ram, S. (2004). Design Science in Information Systems Research. *MIS Quarterly*, *28*(1), 75-105. https://doi.org/10.2307/25148625

Mayring, P. (2021). Qualitative Content Analysis: A Step-by-Step Guide. *SAGE Publications Ltd*.

Myers, M. D., & Newman, M. (2007). The qualitative interview in IS research: Examining the craft. *Information and Organization*, *17*(1), 2–26. https://doi.org/10.1016/j.infoandorg.2006.11.001