Stephan Rabanser

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EDUCATION

- **PhD in Computer Science** — Toronto, Canada
  University of Toronto, advised by Prof. Nicolas Papernot — *September 2020 – May 2024 (exp.)*
  - **Supervisory Committee**: Prof. Nicolas Papernot, Prof. Rahul Krishnan, Prof. David Duvenaud, Prof. Roger Grosse, Prof. Zachary Lipton
  - **Research Interests**: Machine Learning, Robustness, Safety, Reliability, Uncertainty, Causality, Generative Modeling, Representation Learning, Probabilistic Deep Learning, Anomaly Detection, Distribution Shifts, Interpretability, Out-of-Distribution Sample Detection, Healthcare Applications.
  - **TAing**: CSC2541: Neural Network Training Dynamics (Winter 2022), CSC2515: Introduction to Machine Learning (Fall 2022), ECE1784: Trustworthy Machine Learning (Fall 2022)

- **Visiting Graduate Student** — Cambridge, UK
  University of Cambridge, advised by Prof. David Krueger — *June 2023 – September 2023*

- **M.Sc. in Computer Science** — Munich, Germany
  Technical University of Munich (TUM), advised by Prof. Stephan Günnemann — *October 2015 – July 2019*

- **Visiting Research Scholar** — Pittsburgh, PA
  Carnegie Mellon University (CMU), advised by Prof. Zachary Lipton — *August 2018 – January 2019*

- **Honours Degree in Technology Management** — Munich, Germany
  Center for Digital Technology and Management (CDTM) — *August 2015 – June 2017*

- **Visiting Research Student** — Cambridge, MA
  Massachusetts Institute of Technology (MIT), advised by Prof. Thomas Malone — *February 2016 – June 2016*

- **B.Sc. in Computer Science, Minor in Economic Sciences** — Munich, Germany
  Technical University of Munich (TUM) — *October 2012 – October 2015*

EXPERIENCE

- **Machine Learning Researcher** — Toronto, CA
  Vector Institute for Artificial Intelligence — *September 2020 – Present*

- **Intern Applied Scientist** — Munich, Germany
  Amazon, AWS AI Labs — *June 2021 – October 2021*
  - Designed context-invariant time series representations using contrastive and domain-adversarial learning.

- **Intern Applied Scientist** — Munich, Germany
  Amazon, AWS AI Labs — *September 2019 – July 2020*
  - Systematically assessed the impact of I/O representations for deep-learning-based time-series forecasting.

- **Intern Applied Scientist** — Munich, Germany
  Amazon, AWS AI Labs — *May 2018 – August 2018*
  - Evaluated existing and developed new ML-based algorithms for large-scale lossless data compression.
  - Implemented autoencoder-based probability distribution estimation for arithmetic coding on tabular data.

- **Intern Software Development Engineer** — Berlin, Germany
  Amazon, Core Machine Learning — *August 2017 – October 2017*
  - Received an overview of standard time series analysis / forecasting techniques.
  - Implemented Bayes by Backprop (weight uncertainty quantification) for plain MLPs & RNNs in MXNet.

- **Intern Software Development Engineer** — Berlin, Germany
  Amazon, AWS OpsWorks — *July 2016 – October 2016*
  - Developed internal business intelligence tool (business metrics reporting and automated dashboard generation) for new OpsWorks service offering (OpsWorks for Chef Automate).

Publications

Stephan Rabanser, Anvith Thudi, Abhradeep Thakurta, Krishnamurthy Dvijotham, and Nicolas Papernot. **Training Private Models That Know What They Don't Know**. *arXiv preprint arXiv:2305.18393*, 2023 [paper]

Adam Dziedzic, Stephan Rabanser, Mohammad Yaghini, and Nicolas Papernot. *p*-**DkNN: Out-of-Distribution Detection through Statistical Testing of Deep Representations**. *arXiv preprint arXiv:2207.12545*, 2022 [paper]

Stephan Rabanser, Tim Januschowski, Kashif Rasul, Oliver Borchert, Richard Kurle, Jan Gasthaus, Michael Bohlke-Schneider, Nicolas Papernot, and Valentin Flunkert. **Intrinsic Anomaly Detection in Multi-Variate Time Series**. *arXiv preprint arXiv:2206.14342*, 2022 [paper]

Stephan Rabanser, Anvith Thudi, Kimia Hamidieh, Adam Dziedzic, and Nicolas Papernot. **Selective Classification Via Neural Network Training Dynamics**. *arXiv preprint arXiv:2205.13532*, 2022 [paper]

Stephan Rabanser, Tim Januschowski, Valentin Flunkert, David Salinas, and Jan Gasthaus. **The Effectiveness of Discretization in Forecasting: An Empirical Study on Neural Time Series Models**. In *7th KDD Workshop on Mining and Learning from Time Series (MiLeTS)*, 2020. Oral presentation. [paper, slides]

Stephan Rabanser, Stephan Günnemann, and Zachary Lipton. **Failing Loudly: An Empirical Study of Methods for Detecting Dataset Shift**. In *Advances in Neural Information Processing Systems*, pages 1394–1406, 2019 [paper, poster, slides]

Stephan Rabanser, Oleksandr Shchur, and Stephan Günnemann. **Introduction to Tensor Decompositions and their Applications in Machine Learning**. *arXiv preprint arXiv:1711.10781*, 2017 [paper]

Awards & Honors

- **Member of the Elite Network of Bavaria** *Since 2016*
- **Apple WWDC Student Scholarship** *June 2013*

Community Service

- **Reviewing**: NeurIPS (2023, 2022, 2021), ICML (2022, 2021), Distribution Shift Workshop @ ICML (2022), Distribution Shift Workshop @ NeurIPS (2021 – *outstanding reviewer*, 2022), Human Evaluation of Generative Models Workshop @ NeurIPS (2022), Time Series Workshop @ ICML (2021), Time Series Workshop @ KDD (2022), AAAI (2020)
- **Talks**: MIT MIMO Student Research Forum (2022), Intel Private AI Institute Fall Workshop (2022), Microsoft Security Data Science Colloquium (2021)
- **Volunteering**: NeurIPS 2018, ICLR 2019

Selected Coursework

- **Data Science in Astrophysics and Industry** Munich, Germany
  Interdisciplinary Project @ Max Planck Institute for Astrophysics (MPA) *March 2017 – July 2017*
  - Transformed an existing Gaussian mixture model (GMM) into Google TensorFlow.
  - Optimized the algorithmic implementation of the model (e.g. number of mixture components, hyper-parameters) and explored different training methods (stochastic vs. deterministic and expectation maximization (EM) vs. gradient descent vs. Newton).
  - Researched, implemented, and improved online learning techniques for GMMs and compared them to standard EM and tensor decomposition approaches.

Programming Skills

- **Languages**: Python, Java, Swift, HTML/CSS/JS   **ML Frameworks**: PyTorch, Tensorflow, JAX, MXNet