Stephan Rabanser

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Education

- **PhD in Computer Science** — Toronto, Canada
  University of Toronto, advised by Prof. Nicolas Papernot — *September 2020 – Present*
  - **Supervisory Committee**: Prof. Nicolas Papernot, Prof. Rahul Krishnan, Prof. David Duvenaud, Prof. Roger Grosse, Prof. Zachary Lipton
  - **Research Interests**: Machine/Deep Learning, Robustness, Safety, Reliability, Uncertainty, Causality, Generative Modeling, Representation Learning, Anomaly Detection, Distribution Shifts, Interpretability, Out-of-Distribution Sample Detection, Healthcare Applications.
  - **TAing**: CSC2541: Topics in Machine Learning: Neural Net Training Dynamics
- **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, 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**: ICML 2022, Distribution Shift Workshop @ NeurIPS 2021 (*outstanding reviewer*), NeurIPS 2021, Time Series Workshop @ ICML 2021, AAAI 2020
- **Talks**: Microsoft 2021 Security Data Science Colloquium
- **Volunteering**: NeurIPS 2018, ICLR 2019

Selected Coursework

- **De-noising Spectral Clustering Through Latent Data Decomposition** Munich, Germany
  Guided Research Project @ TUM *October 2017 – March 2018*
  - Developed two new methods to make spectral clustering more robust (reduced sensitivity to noise).
  - Modeled problem as latent data decomposition instead of similarity graph decomposition.
  - Initial results outperform similar techniques on many datasets, extensive hyper-parameter tuning is needed.
- **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).
  - Explored different training methods (stochastic vs. deterministic and expectation maximization (EM) vs. gradient descent vs. Newton).
  - Determined parallelizable operations and sync-points.
  - Researched, implemented, and improved online learning techniques for GMMs and compared them to standard EM and tensor decomposition approaches.
- **Teaching Assistant** Munich, Germany
  Swift Introduction Course @ TUM *August 2014 – November 2014*
  - Held a 2h talk and prepared the corresponding tutorial about RESTful interaction with web services within iOS and OS X apps.
  - Developed a course-matching sample API by using Java technologies (Maven, Glassfish, Jersey, JPA).
  - Supported course administration by writing and reviewing course assignments.
  - Highlighted by Apple as one of the first Swift courses at major universities.

Programming Skills

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