Stephan Rabanser

+49 1573 1765174 — stephan@cs.toronto.edu — rabanser.dev

Education

PhD in Computer Science (w/ Prof. Nicolas Papernot) — September 2020 – Present
University of Toronto & Vector Institute — *Toronto, Canada*
Research Interests: Machine/Deep Learning, Robustness, Safety/Reliability, Uncertainty, Causality, Interpretability.

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

Visiting Research Scholar (w/ Prof. Zachary C. Lipton) — August 2018 – January 2019
Carnegie Mellon University (CMU) — *Pittsburgh, PA*
Hosted at the Approximately Correct Machine Intelligence (ACMI) Lab.

Honours Degree in Technology Management — August 2015 – June 2017
Center for Digital Technology and Management (CDTM) — *Munich, Germany*
Joint program of Technical University of Munich (TUM) & Ludwig Maximilian University of Munich (LMU).

Visiting Research Student (w/ Prof. Thomas W. Malone) — February 2016 – June 2016
Massachusetts Institute of Technology (MIT) — *Cambridge, MA*
Hosted at the Center for Collective Intelligence (CCI).

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

Work Experience

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

Intern Applied Scientist (Machine Learning) — September 2019 – July 2020
Amazon / AWS AI Labs — *Munich, Germany*

- Systematically assessed the impact of I/O representations for deep-learning-based time-series forecasting.

Intern Applied Scientist (Machine Learning) — May 2018 – August 2018
Amazon / AWS AI Labs — *Munich, Germany*

- 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 — August 2017 – October 2017
Amazon – Core Machine Learning — *Berlin, Germany*

- Received an overview of standard time series analysis / forecasting techniques.
- Implemented Bayes by Backprop (weight uncertainty quantification) for plain MLPs and RNNs in MXNet.

Intern Software Development Engineer — July 2016 – October 2016
Amazon Web Services (AWS) – OpsWorks — *Berlin, Germany*

- 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, Jan Gasthaus. **The Effectiveness of Discretization in Forecasting: An Empirical Study on Neural Time Series Models**. *Workshop on Mining and Learning from Time Series at KDD 2020*. Selected for oral presentation.
- Stephan Rabanser, Stephan Günnemann, Zachary C. Lipton. **Failing Loudly: An Empirical Study of Methods for Detecting Dataset Shift**. *Accepted to Neural Information Processing Systems (NeurIPS) 2019*. Previously presented at the DebugML Workshop at ICLR 2019.
- Stephan Rabanser, Oleksandr Shchur, Stephan Günnemann. **Introduction to Tensor Decompositions and Their Applications in Machine Learning**. *ArXiv e-prints (November 2017)*. arXiv:stat.ML/1711.10781.

Awards & Honors

ICLR 2019 Student Volunteer May 2019

NeurIPS 2018 Student Volunteer December 2018

Member of the Elite Network of Bavaria Since April 2016

Apple Worldwide Developers Conference (WWDC) June 2013
Student Scholarship Recipient *San Francisco, CA*

- Developed résumé iOS app to highlight academic and professional experience as well as hobbies.
- Got awarded a free WWDC ticket.

Technical Strengths

Programming Languages	Python, Java, Swift, Ruby, C, HTML5/CSS3/JS
ML Frameworks	TensorFlow, PyTorch, MXNet, sklearn
Tools	Git, IDEA Suite, Jupyter, Xcode, Sketch

Selected Coursework

Data Shifts and Distribution Change Point Detection August 2018 – July 2019
Master's Thesis Project – CMU & TUM *Pittsburgh, PA & Munich, Germany*

- Conducted research on dataset shift detection, characterization, and malignancy quantification between training and testing environments.
- Set up a large-scale empirical study to evaluate shift detection potential using statistical two-sample testing on various latent representations.
- Accepted to Neural Information Processing Systems (NeurIPS) 2019.

Denoising Spectral Clustering Through Latent Data Decomposition October 2017 – March 2018
Guided Research – Professorship of Data Mining and Analytics, TUM *Munich, Germany*

- 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 March 2017 – July 2017
Interdisciplinary Project – Max Planck Institute for Astrophysics (MPA) *Munich, Germany*

- 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 August 2014 – November 2014
Swift Introduction Course – Chair for Applied Software Engineering, TUM *Munich, Germany*

- 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.

Languages

German	Native
English	Fluent, TOEFL iBT 112 (November 2018)
Italian	Proficient