Felix Draxler

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I am a Computer Science & Maths PhD student at Heidelberg University, Germany, focusing on machine learning. My main research interest is building generative models that are efficient, general purpose and high-quality. My work has appeared at ICML, NeurIPS, ICLR, AISTATS and GCPR, including orals and a best paper honorable mention at GCPR 2020.

EDUCATION

PhD in Computer Science and Mathematics — Heidelberg University, Germany. 08/2019—present

- Worked on universality, efficiency and inductive biases of generative models.
- Expected graduation: Q3/2024.
- Supervisors: Ullrich Köthe and Christoph Schnörr

M.Sc. Physics — Heidelberg University, Germany. 10/2015—09/2018

- Worked on loss landscape of modern deep learning, found connectivity of minima through low loss paths.
- Supervisors: Fred Hamprecht and Manfred Salmhofer
- Scholarship by State of Bavaria for academic excellence.

B.Sc. Physics — LMU Munich, Germany. 10/2011—04/2015

- PhD in Computer Science and Mathematics, Heidelberg University (Expected Q3 2024).
- Semester abroad: Grenoble INP, France.
- Scholarship by State of Bavaria for academic excellence.

EXPERIENCE

SAP Software Engineer Intern — Walldorf, Germany. 01/2016—12/2016

Analyzed performance of in-memory database by extending Apache JMeter to parallel scheduling in priority customer support team, speeding up existing tools by 10x.

Founder of die archemisten — 04/2010—present

Development of online collaboration platform facilitating communication and documentation for highly fluctuating teams. Based on PHP & TypeScript, with over 600 users.

Chair of Heidelberger Symposium — Heidelberg, Germany. 06/2018—present

Directed 30-headed team to organizing a TED-style conference with 500-1000 participants. Secured funding, coordinated speakers and ensured a collaborative and inclusive environment.

AWARDS

GCPR 2020 best paper honorable mention	2020
Scholarship Max Weber-Programm by State of Bavaria	2011-2018
DPG-Abiturpreis for best outstanding performance in physics	2011

RESEARCH

Highlights

Free-form Flows: Make Any Architecture a Normalizing Flow [arXiv]
Felix Draxler*, Peter Sorrenson*, Lea Zimmermann, Armand Rousselot, Ullrich Köthe
International Conference on Artificial Intelligence and Statistics (AISTATS), 2024

Whitening Convergence Rate of Coupling-based Normalizing Flows [arXiv]
Felix Draxler, Christoph Schnörr, Ullrich Köthe
Advances in Neural Information Processing Systems (NeurIPS), 2022. Oral (top 1.8%)

Essentially No Barriers in Neural Network Energy Landscape [arXiv]
Felix Draxler, Kambis Veschgini, Manfred Salmhofer, Fred Hamprecht
International Conference on Machine Learning (ICML), 2018. Long oral (top 8.6%)

Recent Preprints

On the Universality of Coupling-based Normalizing Flows
Felix Draxler, Stefan Wahl, Christoph Schnörr, Ullrich Köthe
Preprint, 2024

Learning Distributions on Manifolds with Free-form Flows
Peter Sorrenson*, **Felix Draxler***, Armand Rousselot*, Sander Hummerich, Ullrich Köthe
Preprint, 2023

All Peer-reviewed Conference & Journal Publications

Free-form Flows: Make Any Architecture a Normalizing Flow
Felix Draxler*, Peter Sorrenson*, Lea Zimmermann, Armand Rousselot, Ullrich Köthe
International Conference on Artificial Intelligence and Statistics (AISTATS), 2024

Lifting Architectural Constraints of Injective Flows
Peter Sorrenson*, **Felix Draxler***, Armand Rousselot, Sander Hummerich, Lea Zimmermann, Ullrich Köthe
International Conference on Learning Representations (ICLR), 2024

On the Convergence Rate of Gaussianization with Random Rotations
Felix Draxler, Lars Kühmichel, Armand Rousselot, Jens Müller, Christoph Schnörr, Ullrich Köthe
International Conference on Machine Learning (ICML), 2023

Bose Einstein Condensate as Nonlinear Block of a Machine Learning Pipeline
Maurus Hans, Elinor Kath, Marius Sparn, Nikolas Liebster, **Felix Draxler**, Christoph Schnörr, Helmut Strobel, Markus K Oberthaler
Physical Review Research 6, 013122

Finding Competence Regions in Domain Generalization
Jens Müller, Stefan T Radev, Robert Schmier, **Felix Draxler**, Carsten Rother, Ullrich Köthe
Transactions of Machine Learning Research (TMLR), 2023

Whitening Convergence Rate of Coupling-based Normalizing Flows
Felix Draxler, Christoph Schnörr, Ullrich Köthe
Advances in Neural Information Processing Systems (NeurIPS), 2022. Oral (top 1.8%)

Characterizing the Role of a Single Coupling Layer in Affine Normalizing Flows
Felix Draxler, Jonathan Schwarz, Christoph Schnörr, Ullrich Köthe
German Conference on Pattern Recognition (GCPR), 2020. Best paper honorable mention (top 3)

Riemannian SOS-Polynomial Normalizing Flows
Jonathan Schwarz, **Felix Draxler**, Ullrich Köthe, Christoph Schnörr
German Conference on Pattern Recognition (GCPR), 2020

On the Spectral Bias of Neural Networks
Nasim Rahaman, Aristide Baratin, Devansh Arpit, **Felix Draxler**, Min Lin, Fred Hamprecht, Yoshua Bengio, Aaron Courville
International Conference on Machine Learning (ICML), 2019. Long oral

Essentially No Barriers in Neural Network Energy Landscape
Felix Draxler, Kambis Veschgini, Manfred Salmhofer, Fred Hamprecht
International Conference on Machine Learning (ICML), 2018. Long oral (top 8.6%)

Scientific Software

FrEIA: Framework for Easily Invertible Architectures
Lynton Ardizzone, Till Bungert, **Felix Draxler**, Ullrich Köthe, Jakob Kruse, Robert Schmier, Peter Sorrenson

lightning-trainable: Fast, reproducible prototyping for PyTorch Lightning
Lars Kühmichel, **Felix Draxler**

COMMUNITY SERVICE

Reviewer for AISTATS, ICLR, NeurIPS, ICML and workshops. Organizer of GCPR 2023.

INVITED TALKS

Fraunhofer Institute for Industrial Mathematics ITWM	2023
Tutorial Speaker at GCPR 2023	2023
New York University, Courant Institute of Mathematical Sciences	2022
Oral presentation at NeurIPS 2022	2022
York University, Department of Electrical Engineering and Computer Science	2022
Stanford, Department of Computer Science	2022
Yale University, Smita Krishnaswamy	2022
Oral presentation at GCPR 2020	2020
UCLA/MPI MiS, Math Machine Learning Seminar	2020
Aspen Winter School on Theoretical Physics for Machine Learning	2019
Oral presentation at ICML 2018	2018

REFERENCES

Prof. Dr. Ullrich Köthe: ullrich.koethe@iwr.uni-heidelberg.de
PhD Advisor

Prof. Dr. Christoph Schnörr: schnoerr@math.uni-heidelberg.de
PhD Advisor

Prof. Dr. Fred Hamprecht: fred.hamprecht@iwr.uni-heidelberg.de
M.Sc. Advisor

Prof. Dr. Carsten Rother: carsten.rother@iwr.uni-heidelberg.de
Research Mentor