

Curriculum Vitae

Personal Information

Name Katja Hauser
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Education

- 04/2020 – present **Applied Computer Science, Heidelberg University**
- PhD
 - Focus Areas:
 - RNA base calling with focus on modified bases
 - Invertible neural networks for sequence analysis
 - Explainability and uncertainty quantification
- 04/2017 - 12/2019 **Applied Computer Science, Heidelberg University**
- Master of Science, grade average 1.1¹
 - Specialization:
 - Machine Learning
 - Knowledge Discovery in Data Bases
 - Scientific Visualization
- 10/2012 - 04/2017 **Applied Computer Science, Heidelberg University**
- Bachelor of Science, grade average 1.8
 - Specialization:
 - Knowledge Discovery in Data Bases
 - Scientific Visualization
- 2012 **Hebel-Gymnasium, Schwetzingen**
- University Entrance Qualification (Abitur), grade average 1.4

¹ Grades range from 1-6 with 1 being the best.

Practical Experience

- 04/2020 – present **PhD, Heidelberg University**
- Topic “Practical Application and Theoretical Analysis of Invertible Neural Networks”
 - Key topics:
 - RNA base calling from nanopore data with focus on modified bases using a transformer neural network²
 - Creating an invertible neural networks for sequence analysis by designing invertible self-attention
 - Explainability and uncertainty quantification
- 06/2019 – 12/2019 **Master’s Thesis, Heidelberg University**
- Thesis “Exploration of INNs³”
 - Key topics:
 - Mode finding on toy data, i.e., finding high probability regions in learned feature space as well as in known latent space, mapping the latter to feature space
 - Analysis of the transport of data from feature to latent space and vice versa
 - Network pruning using layer-wise pruning by different criteria (e.g., average magnitude of weights or a layer’s contribution to the transport) and iterative magnitude pruning⁴
 - Ensembles, uncertainty quantification and outlier detection: performance of ensembles of INNs, uncertainty quantification using Deep Ensembles⁵ and outlier detection using WAIC⁶
- 10/2018 – 06/2019 **Preparations for Master’s Thesis, Heidelberg University**
- Familiarization with work of VLL group⁷
 - Work on finding modes in toy data sets with INNs
- 04/2018 - 10/2018 **Advanced Machine Learning, Heidelberg University**
- Lecture and group project
 - Project topic "Predicting Genres of Books from Project Gutenberg": implementation and analysis of several machine learning approaches (among others a "Naive Bayes" classifier, a feed-forward neural network and an LSTM)

2 Ashish Vaswani, Noam Shazeer, Niki Parmar, Jakob Uszkoreit, Llion Jones, Aidan N. Gomez, Łukasz Kaiser, and Illia Polosukhin. 2017. *Attention is all you need*. In *Proceedings of the 31st International Conference on Neural Information Processing Systems (NIPS’17)*. Curran Associates Inc., Red Hook, NY, USA, 6000–6010.

3 Invertible Neural Networks (INNs) from L. Ardizzone, J. Kruse, S. J. Wirkert, D. Rahner, E. W. Pellegrini, R. S. Klessen, L. Maier-Hein, C. Rother, and U. Köthe. *Analyzing inverse problems with invertible neural networks*. In *International Conference on Learning Representations*, 2019.

4 J. Frankle and M. Carbin. *The lottery ticket hypothesis: Finding sparse, trainable neural networks*, In *International Conference on Learning Representations*, 2019.

5 B. Lakshminarayanan, A. Pritzel, and C. Blundell. *Simple and scalable predictive uncertainty estimation using deep ensembles*, In *Advances in Neural Information Processing Systems*, 2017

6 Following H. Choi, E. Jang, and A. A. Alemi. *Waic, but why? generative ensembles for robust anomaly detection*, arXiv preprint arXiv:1810.01392, 2018., WAIC: S. Watanabe. *Algebraic Geometry and Statistical Learning Theory*. 2009.

7 Visual Learning Lab (VLL) at Heidelberg university, <https://hci.iwr.uni-heidelberg.de/vislearn/>

Work Experience

- 04/2017 - 08/2017 **Student Assistant, Heidelberg University**
- Teaching assistant for the lecture "Betriebssysteme und Netzwerke"⁸
 - Graded homework and exams, planned and taught weekly tutorials for a group of about 30 students
- 04/2016 - 09/2016 **Student Assistant, Heidelberg University**
- Teaching assistant for the lecture "Betriebssysteme und Netzwerke"
 - Graded homework and exams, planned and taught weekly tutorials for a group of about 30 students
- 10/2015 - 03/2016 **Student Assistant, Heidelberg University**
- Teaching assistant for the lecture "Einführung in die Praktische Informatik"⁹
 - Graded homework and exams, planned and taught weekly tutorials for two groups of about 20 students with a focus on C++ basics
- 11/2014 - 06/2015 **Student Assistant, Heidelberg University**
- Programmer (C++) at the "Visualization and Numerical Geometry" group
 - Implemented algorithms for the efficient computation of ray-object intersections

Programming Languages

Python - excellent

- Practical homework for several lectures, two student projects, main work for bachelor's and master's theses
- Programming experience, among others, with `numpy`, `scipy` and `pytorch`, `matplotlib` and `networkx`, `pymongo` and `re`

C++ - good

- Main focus of two courses (mandatory programming course and Object Oriented Programming for Scientific Computing (grade 1.0)), practical homework for an additional lecture
- Taught basic concepts (including pointers, inheritance and templates) as tutor (10/2015 - 04/2016)
- Main programming language during work as a student assistant (11/2014 - 06/2015)

R - solid understanding

- Practical homework for a lecture
- Main programming language for a student project (grade: 1.0)

8 "Operating Systems and Networks"

9 "Introduction to Applied Computer Science"

Additional Skills

Proficiency in IT Tools

git - good

- Version control system for several projects
- Safe handling and understanding of the basic work flow (add-commit-push), branching, reverting, merging
- Safe handling of advanced functionality (changing commit history)

svn - solid understanding

- Version control system for two projects
- Safe handling of the basic work flow

LaTeX - excellent

- Msc thesis, Bsc thesis, numerous reports and presentations

Language Skills

<i>German</i>	native language
<i>English</i>	business fluent
<i>Russian</i>	proficient
<i>Turkish</i>	beginner

Experience Abroad

- 08/2017 - 01/2018 **Saint Petersburg, Russia**
- Semester abroad at Saint Petersburg State University

Further Interests

Russian literature, bouldering, standard and latin dances