

# Maurice Frank

## Machine learning researcher



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I like to hunt creative solutions to challenging problems with the use of machine learning. I want my work to have a real positive impact on the world and I favour team-work with enthusiastic colleagues. My current academic interest lies in deep generative modelling and Bayesian methods, VAEs and Flows as well as a better understanding of our deep learning methods and how to make them reliable and fair. I am especially intrigued by work on and applications to music and sound as well as an understanding of human perception. I have strong theoretical backgrounds on machine learning and a background in physics and mathematics.

### EDUCATION

M.Sc. Artificial Intelligence **awarded cum laude** GPA 4/4

📍 Universiteit van Amsterdam

📅 2018 – 2020

Research degree with most contemporary topics in AI/ML

- Theory and practical implementation of the concepts of machine and deep learning: CNNs, RNNs/LSTMs, VAEs/Flows, GANs, MCMC/sampling, Gaussian process/Bayesian modelling, ICA
- Specialization in topics: Theoretical machine learning, Computer Vision, Reinforcement Learning, NLP, Information theory

**Thesis:** Investigating Bayesian methods for unsupervised music source separation. Do generative models know what they don't know? 📖 [Read](#)  
**Supervisor:** Maximilian Ilse (AMLab), Dr Efstratios Gavves

B.Sc. Applied Computer Science GPA 3.58/4

📍 University Heidelberg

📅 2014 – 2017

General degree on all topics of Computer Science

- Specialization on image processing and pattern recognition: Deep Learning, 3D Computer vision, medical image analysis, fairness in AI
- Courses on Practical CS, Algorithms, DBMS, Theoretical informatics, Numerical methods and software engineering

**Thesis:** Using a FCN-ResNet based detector the thesis provides a reverse image search tool here in particular to retrieve art historic images containing an object given by a reference image. 📖 [Read](#)  
**Supervisor:** Dr Miguel Bautista Martin, Prof. Dr Björn Ommer

B.Sc. Physics

📍 University Heidelberg

📅 2013 – 2014

Change of degree after the first year, kept as minor studies.

### PUBLICATIONS

- [1] **Dec. 2020** (with Maximilian Ilse). "Problems Using Deep Generative Models for Audio Source Separation". In: *NeurIPS2020 I Can't Believe It's Not Better! Workshop*. Spotlight presentation. URL: <https://arxiv.org/abs/2011.01761>.

### VOLUNTARY WORK

CO-Founder / Member

📍 Ackersyndikat

📅 11/2020 –

Germany-wide non-profit cooperative trying to build a financing model for self-organized ecological farming businesses.

CO-Founder / Member

📍 Collegium Academicum, Heidelberg

📅 06/2015 –

Student-founded non-profit company building sustainable student housing. We are building an innovative living space for 200 young people. Creating an educational center for holistic self-learning.

team building / lead generation / design work

### INDUSTRY EXPERIENCE

Machine learning scientist

📍 Hummingbird Diagnostics, Heidelberg

📅 11/2020 –

Development of deep learning based approaches to cancer and disease detection from liquid biopsy (blood samples). Working with sequence embedding models and graph networks on microRNA biomarkers. Focus on unsupervised representation learning and explainability.

Python / PyTorch / R / Biostatistics

Machine learning engineer – Intern

📍 BMW Group, Munich

📅 06/2019 – 08/2019

Worked within the engine development department. Building statistical models to analyze engine part quality and live fleet monitoring. Building a production-ready data visualization app.

Official corporate testimony: *Significantly exceeds requirements at all times* in all criteria, engineering, analytical skills and teamwork.

Python / PySpark / Palantir Foundry / Dash / Agile development

Full-stack web developer

📍 Bürgerwerke eG, Heidelberg

📅 01/2018 – 08/2018

Ground-up development of a team communication and organization web portal in Ruby on Rails. Backend and Frontend work. Software engineering from planning the project until complete delivery.

Rails / Ruby / Software Engineering

Laboratory software administrator

📍 Alfred-Weber-Institute, Heidelberg

📅 06/2016 – 06/2017

Administrator in a computer lab for Behavioral Economics experiments. Development new features of an experiment administration software.

Ruby / Python / Windows server

### TEACHING EXPERIENCE

Graduate Teaching Assistant

📍 Universiteit van Amsterdam

📅 01/2020 – 04/2020

Assisting with the master level courses *Information Retrieval* and *Fairness, Accountability, Confidentiality and Transparency in AI*. Teaching tutorial sessions, correcting course work and support students in finishing scientific work and writing.

Teaching Assistant

📍 University Heidelberg

📅 10/2015 – 02/2016

Assisting with the Bachelor course *Practical Computer Science*. Teaching in self-prepared weekly tutorial session.

### SKILLS

- Excellent skills in machine learning engineering with Python: PyTorch, TensorFlow, Caffe, Pandas, SciPy, OpenCV
- DevOps engineering experience with: Scikit-learn, Skorch, Ray, wandb, PyTorch Lightning, DASK
- Excellent skills in using GNU/Linux systems: System administration, BASH, Perl, Git, Slurm
- Strong skills in data visualization: pyplot, Dash (plotly), web technologies
- Engineering experience in working with: MATLAB, Java, C++, JavaScript
- *Spoken languages:* German native, English fluent (TOEFL 112/120), Persian and Dutch beginner level