Georg Wölflein

georg@woelflein.eu | GitHub | Google Scholar | LinkedIn

Education

Doctor of Philosophy (PhD), Computer Science **(Aug 2021 onwards)**
University of St Andrews, UK
My PhD is under the supervision of Dr Ognjen Arandjelović and lies at the intersection of deep learning, computer vision, and medical imaging for digital pathology.

Master in Science (MSci), Computer Science **(Sep 2017 – Jun 2021)**
University of St Andrews, UK (direct entry into second year)
First-Class Honours, GPA: 95%.
Master's thesis: "Determining chess game state from an image" (grade: 20.0/20).
Honours level courses include machine learning, AI principles & practice, language & computation, data-intensive systems, information visualisation, concurrency & multi-core architectures, constraint programming, software architecture, software engineering, complexity, OS, databases, data encoding, component technology, logic, software verification, compiler design & implementation

International Baccalaureate Diploma and German Abitur **(2005 – 2017)**
Dresden International School, Germany
IB Diploma: 40 points; German Abitur: 1.3; Valedictorian.

Experience

Working Student – Deep Learning & Computer Vision **(May 2018 – present)**
Robotron Datenbank-Software GmbH *Dresden, Germany (and remotely)*
Gained practical experience in machine learning and software engineering by developing deep learning models and deploying them to production in the Realtime Computer Vision (RCV) department.

- Selected and trained machine learning models for various industrial use cases, including a system for a car manufacturer that reduced the error rate of detecting faulty parts by 90%.
- Developed a pipeline for object detection, classification and segmentation with TensorFlow.
- Designed and implemented containerised infrastructure for training, evaluating, and deploying TensorFlow and PyTorch models for industrial use cases.
- Implemented real-time object detection on video streams using TensorFlow.

Summer Analyst **(Jun-Aug 2019)**
J.P. Morgan *Glasgow, UK*
Developed a data visualisation and reporting dashboard for an automated testing framework using Python, React, TypeScript, and SQL that gave the team new insights. Gained hands-on experience with Scrum, working in a team, and prioritising requirements from different stakeholders.

Skills

Programming languages:	Python, C/C++, Java, SQL, JavaScript, TypeScript, Haskell, C#, LaTeX
Technologies:	TensorFlow, Keras, PyTorch, Docker, Apache Spark, mongodb, Splunk, Postgres, React, D3.js, Tableau
Languages:	German, English *(mother tongue)*; French *(B1)*

Prizes and awards

- Adobe Prize (£750) for the highest GPA in Senior Honours Computer Science (2020)
- 4x Dean's List Award of Academic Excellence at the University of St Andrews (2018 – 2021)
- Valedictorian at Dresden International School (Class of 2017)
- Subject awards for mathematics and computer science (2017)
- 12x High Honour Roll (GPA over 6.0 of 7) at Dresden International School (2010 – 2017)

Publications

Wölflein, **G.**, & Arandjelović, O. (2021). Determining chess game state from an image. *Journal of Imaging*, *7*(6). https://doi.org/10.3390/jimaging7060094

Published datasets

Wölflein, **G.**, & Arandjelović, O. (2021). Dataset of rendered chess game state images. https://doi.org/10.17605/OSF.IO/XF3KA

Selected projects and coursework

thesis **Determining chess game state from an image** achieved grade 20.0/20 **(2020)**
https://www.chesscog.com and https://github.com/georg-wolflein/chesscog
For my master's thesis, I developed a system for identifying the chess position from a photo of a chess game using deep learning as well as traditional computer vision techniques. The system improves the state of the art error rate by a factor of 23. Further, I demonstrate a one-shot transfer learning approach to adapt the system to an unseen chess set based on just two images. The report is available here and a live demo is at chesscog.com.

project **Recap: configuration for reproducible research** **(2020)**
https://pypi.org/project/recap and https://github.com/georg-wolflein/recap
Research should be reproducible. Especially in deep learning, it is important to keep track of hyperparameters and configurations used in experiments. I had to write similar configuration management code in several projects, so I created a Python package and published it on PyPI.

thesis **Neural surfing** achieved grade 19.0/20 **(2019 – 2020)**
https://github.com/georg-wolflein/neural-surfing
For my undergraduate thesis, I investigated the local minimum problem in neural networks and developed a novel technique for training neural networks. Through this project, I developed independent research and academic writing skills whilst learning a lot about neural networks and machine learning. The report is available here, and a paper is currently in preparation.

Courses and training

Deep Learning Specialisation @ Coursera **(June 2020)**
Completed Andrew Ng's famous Deep Learning specialisation consisting of five courses covering topics such as hyperparameter tuning, regularisation, CNNs, RNNs, etc. with practical case studies.

PyTorch for Deep Learning and Computer Vision @ Udemy **(May 2020)**
Completed an introductory course to PyTorch with a focus on computer vision applications.

Mathematics for Machine Learning Specialisation @ Coursera **(Sep 2019)**
Completed an online specialisation run by Imperial College London consisting of three courses covering a range of topics including linear algebra, multivariate calculus, statistics and PCA.

TensorFlow 2.0: A Complete Guide on the Brand New TensorFlow @ Udemy **(Sep 2019)**
Completed a course to switch from TF1.x to TF2.0, including some interesting applications like RL.

C/C++ Course @ Volkshochschule Dresden **(2013 – 2014)**
Attended a three-month course on the basics of C/C++ at Community College Dresden.

Hackathons

Attending several hackathons allowed me to improve teamwork and leadership skills.

- NASA Space Apps Challenge (Oct 2020)
- University of St Andrews StacsHack (placed 3rd) (Apr 2018)
- Glasgow University Tech Society (GUTS) hackathon (Oct 2017)
- J.P. Morgan Code for Good hackathon (Nov 2017)

Volunteering

Secretary of the St Andrews Muscle and Athletics Sports Society (MASS) **(2018 – 2020)**
As secretary of MASS, I was in charge of coordinating meetings, writing minutes, and taking care of administrative tasks. This position has helped me develop teamwork and organisational skills.

Volunteer firefighter **(2010 – 2017)**
I am passionate about giving back to the community. Since the age of eleven, I have been in my local fire department as a youth fire fighter. In 2015, I completed the training qualification and became an active member of the adult fire department, meaning that I participated in alarms until I moved to Scotland in September 2017.

In my free time, …

I enjoy playing chess, volleyball, lifting weights, and improvising on the piano.