Georg Wölflein

Education

since Aug 2021   **Doctor of Philosophy (PhD), Computer Science**, *University of St Andrews*, Scotland.
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.

Sep 2017 – Jun 2021
(2ⁿᵈ year direct entry)   **Master in Science (MSci), Computer Science**, *University of St Andrews*, Scotland.
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.

2005 – 2017   **International Baccalaureate and Abitur**, *Dresden International School*, Germany.
IB Diploma: 40 points, German Abitur: 1.3
Valedictorian. Higher level subjects: maths, physics, computer science.

Experience

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

- Selected and trained deep 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.

Jun-Aug 2019   **Software Engineering Intern**, *J.P. Morgan*, Glasgow, Scotland.
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.

Prizes and awards

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

Publications

Journal articles

2021   **G. Wölflein** and O. Arandjelović, "Determining chess game state from an image," *Journal of Imaging*, vol. 7, no. 6, Jun. 2021. (link)

Datasets

2021   **G. Wölflein** and O. Arandjelović, *Dataset of rendered chess game state images*, Open Science Foundation, May 2021. (link)

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Skills

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

Selected projects and coursework

2021   **Determining chess game state from an image**, *master's thesis*, grade: 20.0/20.

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.

2020   **Recap: configuration management for reproducible research**, *Python package*.

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.

2020   **Freeing neural training through surfing**, *SH project*, grade: 19.0/20.

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

Jun 2020	Deep Learning Specialisation, *Coursera*.
May 2020	PyTorch for Deep Learning and Computer Vision, *Udemy*.
Sep 2019	Mathematics for Machine Learning Specialisation, *Coursera*.
Sep 2019	TensorFlow 2.0: A Complete Guide on the Brand New TensorFlow, *Udemy*.
2013 – 2014	C/C++ Course, *Volkshochschule Dresden (Community College Dresden)*.

Hackathons

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

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

Volunteering

2018 – 2020   **Secretary**, *St Andrews Muscle and Athletics Sports Society (MASS)*.

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.

2010 – 2017   **Volunteer firefighter**, *Freiwillige Feuerwehr Possendorf*.

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.

Interests

In my free time, I enjoy playing chess, volleyball, lifting weights, and improvising on the piano.