HANNES STÄRK

M.Sc. Informatics Student with Machine Learning major at TUM, Munich, DE

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EDUCATION

M.Sc. Informatics | Machine Learning major
Technical University Munich

📅 since Oct 2019   📍 Munich, DE   💼 Full-time

- 2nd Year: Advanced topics in machine learning and probabilistic inference
- 1st Year: Introduction to machine learning and learning theory
- 📖 Attending and regularly presenting papers at the theoretical foundations of AI and protein prediction reading groups

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B.Sc. Informatics | Mathematics track
Bundeswehr University Munich

📅 Sept 2017 – Sept 2019   📍 Munich, DE   💼 Full-time

- 2nd Year: Networking, statistics, and advanced maths
- 1st Year: Mathematics, algorithms, and programming foundations
- 📱 Built concept and started development of the app CoachPTBS

RESEARCH EXPERIENCE

Master's Thesis
Prof. Pietro Liò, Computer Laboratory, Cambridge University

📅 Feb 2021 – Present   📍 Cambridge, UK   💼 Full-time remote

- **3D aware self-supervised learning for small molecular graphs**
- Leveraging rotation and translation invariances of molecules for SSL

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Interdisciplinary project Bioinformatics
Prof. Burkhard Rost, Bioinformatics chair, Technical University Munich

📅 Sept 2020 – Feb 2021   📍 Munich, DE   💼 Full-time course

- **Developed new attention mechanism and architecture for predicting proteins' subcellular location beating the previous SOTA by 5 percentage points**
- Evaluate different types of learned representations for proteins and what information is captured by Transformers' protein embeddings

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Guided Research Computer Vision
Prof. Matthias Nießner's CV & AI chair, Technical University Munich

📅 March 2020 – Sept 2020   📍 Munich, DE   💼 Full-time course

- **Generating new views of a scene captured only with a handful of images using Neural Radiance Fields; collaboration with two other students**
- Adapted Neural Radiance Fields for a dynamic scene of a human to interpolate between and render different views and human poses
- 📄 "Neural Radiance Fields for Novel View and Human Pose Synthesis" (unpublished) with video ▶ explanation and code ⌨

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Seminar: Selected topics in machine learning
Prof. Stephan Günnemann's ML group, Technical University Munich

📅 April 2020 – Sept 2020   📍 Munich, DE   💼 Full-time course

- Seminar where each student wrote a survey on selected machine learning topics and had to review the papers of three other students
- 📄 A detailed "Survey on Transformers" (unpublished)

PUBLICATIONS

- Stärk, Hannes et al. (2021) "Light Attention Predicts Protein Location from the Language of Life". In: *To appear at the ICLR 2021 AI4PH and MLPCP workshops. Under review for ICML 2021*.

SUMMARY

I am passionate about MACHINE LEARNING and especially GRAPH REPRESENTATION LEARNING. I have hands-on experience from academia + industry and am now fully devoted to research. My main expertise has revolved around Transformers for PROTEIN PREDICTION, and SYMMETRY aware GNNs. I am a researcher with a mathematical background, eager to learn about important problems and find impactful solutions.

SKILLS

Python   ● ● ● ● ○
Main language in projects and personal use

Java + Scala   ● ● ● ○ ○
Two years of backend development and main language during studies

Other Languages: HTML, CSS, JavaScript (proficient) R, C++, SQL, ARM assembly, Swift, MATLAB (used occasionally)

PyTorch   ● ● ● ● ○
Protein localization prediction, Neural Radiance Fields, Graph representations in reinforcement learning, WaveNet for denoising audio, Enzyme prediction + projects done as coursework, exercises created for courses

TensorFlow, Keras   ● ○ ○ ○ ○
Variational Autoencoder for remote sensing images

Other: Spectral Methods for Graphs, Audio processing, Robotics, Computer Vision and Graphics, Git, Unix systems, Shell, Docker, Cloudfoundry, Jenkins, Unittesting, Jupyter, LaTeX, **clean code**, AWS, Google Cloud Platform

Languages:

German   ● ● ● ● ●
Native Speaker

English   ● ● ● ● ●
Professional Proficiency | 96% in TOEFL test

French   ● ○ ○ ○ ○
Secondary language at school and from friends

Skill rankings represent personal frame of reference

LEISURE

Sports: Gymnastics, Calisthenics, Acrobatics
Maths: Explaining and illustrating short topics from maths or science, Watching online lectures, and writing summaries with reviews
Other: Chess ♟, reading popular science, attending ML conferences, paper discussion groups

WORK EXPERIENCE

Teaching Assistant for Operations Research
Technical University Munich, Decision Sciences

📅 April 2021 – Sept 2021 📍 Munich, DE 💼 Part-time

🔑 **Giving 2 exercise sessions per week**
- Explaining lecture content and answering questions via online teaching tool

Mathematics Lecturer
BIB Augsburg gGmbH

📅 since Feb 2020 📍 Augsburg, DE 💼 Part-time

🔑 **Teaching linear algebra, analysis, and statistics**
- Organizing online teaching and weekly individual lessons
- Student mediation and counseling. Collecting feedback, Weekly reports

Teaching Assistant for Deep Learning
Technical University Munich, CV & AI Niessnerlab

📅 Nov 2020 – April 2021 📍 Munich, DE 💼 Part-time

🔑 **Held office hours and gave lessons to subgroups of the students**
- Created exercises and learning material like jupyter notebooks or graphics
- Explained lecture content and answered questions via online teaching tool

Student Assistant
Institute of Mathematics and OR, Bundeswehr University Munich

📅 Sept 2018 – July 2019 📍 Munich, DE 💼 Part-time

🔑 **Worked on causal inference for train traffic data with structure learning in Bayesian networks and validated approaches with simulation data**
- Implemented and evaluated methods for regression on time-series data

🖥 PyTorch, Python, Anylogic simulations, Recurrent neural networks, SARIMA, ARIMAX, LSTMs, Bayesian network structure learning, causal inference

Dual Study Program
Allianz Deutschland AG

📅 Sept 2017 – Sept 2019 📍 Munich, DE 💼 Part-time

🔑 **Web-development and digital infrastructure maintenance in an agile development team, technical training in computer science**
- Designed and Developed an app for organizing large software releases
- Provided web-applications for customer interaction and deployment pipelines

🖥 Java (Spring Boot), HTML, CSS, TypeScript (Angular), Git, Jenkins, software engineering best practices, clean and fast programming

PROJECTS AND ACTIVITIES

GNNs for Reinforcement Learning
Technical University Munich

📅 Nov 2020 – Mar 2021 📍 Munich, DE

- **Project in a course: using graph representations of robots in reinforcement learning**
- Implementing and evaluating Graph Neural Networks that are able to capture the full spatial geometry of a represented robot

📄 "Graph representations in Reinforcement Learning"

Gymnastics and Acrobatics Trainer
VfL Buchloe

📅 Sept 2015 – Present 📍 Buchloe, DE

- Started acrobatics show group Akrobatik Astral
- Training gymnastics and acrobatics groups
- Choreograp and participate in shows ▶

Bachelor's Thesis
Bundeswehr University Munich

📅 May 2019 – Sept 2019 📍 Munich, DE

- Implemented a convolutional variational autoencoder and investigated methods for interpolating in the latent space and understanding it with t-SNE and linear probing
- "Understanding Variational Autoencoders' Latent Representations of Remote Sensing Images"

Tool for calculating Network centralities
Bundeswehr University Munich

📅 Feb 2019 – Aug 2019 📍 Munich, DE

- Implemented a web application that calculates different centrality measures for arbitrary graphs
- Wrote a report about the tool and the algorithms for the spectrum based centrality measures

Talent base Memmingen: Physics
BSG Memmingen

📅 Sept 2016 – Jul 2017 📍 Memmingen, DE

- Extracurricular program where we built a nitrogen laser using high voltage to ionize a thin strip of air