

# HANNES STÄRK

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

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HannesStark

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## EDUCATION

M.Sc. Informatics | Machine Learning major

Technical University Munich

since Oct 2019

Munich, DE

Full-time

- 2<sup>nd</sup> Year: Advanced topics in machine learning and probabilistic inference
- 1<sup>st</sup> Year: Introduction to machine learning and learning theory

Attending and regularly presenting papers at the theoretical foundations of AI and protein prediction reading groups

B.Sc. Informatics | Mathematics track

Bundeswehr University Munich

Sept 2017 – Sept 2019

Munich, DE

Full-time

- 2<sup>nd</sup> Year: Networking, statistics, and advanced maths
- 1<sup>st</sup> 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

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

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"Neural Radiance Fields for Novel View and Human Pose Synthesis" (unpublished) with [video](#), [explanation](#) and [code](#)

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, Cloud-foundry, 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
- Choreograph 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