

HANNES STÄRK

MIT Research Intern - M.Sc. Informatics from TUM, Munich, DE

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EDUCATION

M.Sc. Informatics | Machine Learning major

Technical University of Munich

Oct 2019 - Sept 2021 Munich, DE Full-time

- 2nd Year: Advanced topics in machine learning and probabilistic inference
 - 1st Year: Introduction to machine learning and learning theory
- Attending 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

- Built concept and started development of the app CoachPTBS

EXTRACURRICULAR TRAINING

Machine Learning Summer School: MLSS

Aug 2021 Taipei, TW Selective Admission

- Strong student award + fee waiver and nominated for best paper

Eastern European Machine Learning Summer School: EEML

Jul 2021 Budapest, HU Selective Admission

London Geometry and Machine Learning Summer School: LOGML

Jul 2021 London, UK Selective Admission

PRAIRIE/MIAI AI Summer School: PAISS

Jul 2021 Remote Selective Admission

MAIN RESEARCH PROJECTS

MIT Internship: Geometric DL for Binding Prediction

Tommi Jaakkola, MIT + Regina Barzilay, MIT + Octavian Ganea, MIT

since Oct 2021 Boston, USA Full-time

- 3D GNN simultaneously reasons about atom positions of a protein and a small molecule to predict whether it fits into the protein's binding pocket

Master's Thesis on Graph Representation Learning

Pietro Liò, Cambridge University + Stephan Günnemann, TUM

Mar 2021 - Sept 2021 Cambridge, UK Full-time remote

- Self-supervised learning for small molecular graphs: Thesis
- Use SSL to pre-train a GNN by learning joint embeddings between the GNN's representations and the 3D information of a molecule: [video explanation](#)

Protein Language Models for Protein Prediction

Burkhard Rost, Technical University of Munich

Sept 2020 - Feb 2021 Munich, DE Full-time course

- Developed **attention mechanism and architecture** for predicting proteins' subcellular location beating SOTA by 8 percentage points: [video](#)

PUBLICATIONS

- Stärk, Hannes et al. (2021) "3D Infomax improves GNNs for Molecular Property Prediction". In: *Preprint. Under review.*
- Kefato, Z.; Stärk, Hannes et al. (2021) "Jointly Learnable Data Augmentations for Self-Supervised GNNs". In: *Preprint. Under review.*
- Stärk, Hannes et al. (2021) "Light Attention Predicts Protein Location from the Language of Life". In: *To appear in OUP Bioinformatics Advances. Posters + contributed talk at ICLR'21 AI4PH and ICLR'21 MLPCP. Poster + long talk at MLCSB 2021. Poster + talk at WCB 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 revolves around symmetry aware **GNNs** for **MOLECULES** and **SELF-SUPERVISED LEARNING** on graphs. Previously, I worked on transformers for **PROTEIN PREDICTION**. 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

LEISURE

Sports: Gymnastics, Calisthenics, Acrobatics
Watching online lectures, Writing about maths, Chess ♚♜, Paper discussion groups

AWARDS

🏆 Highest prize money award at WCB ICML'21

WORK EXPERIENCE

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

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

TEACHING

Operations Research

Technical University of Munich, Decision Sciences

📅 April 2021 – Sept 2021 📍 Remote 🛒 Part-time

Deep Learning

Technical University of Munich, CV & AI Niessnerlab

📅 Nov 2020 – April 2021 📍 Remote 🛒 Part-time

VOLUNTARY WORK

Reviewer for ML4H 2021 Symposium

2021 Machine Learning for Health Symposium

📅 Sept 2021 - Oct 2021 📍 Remote 🛒 Part-time

- Review papers on graph representation learning and NLP

ICML 2021 Volunteer

International Conference on Machine Learning

📅 Jul 2021 📍 Remote 🛒 One-time event

- Helped presenters during poster and live sessions and in workshops

ICLR 2021 Volunteer

International Conference on Learning Representations

📅 April 2021 – May 2021 📍 Remote 🛒 One-time event

- Helped presenters during poster and live sessions and in workshops

Gymnastics and Acrobatics Trainer

VfL Buchloe

📅 Sept 2015 – Present 📍 Buchloe, DE

- Started acrobatics show group **Akrobatik Astral**
- Training gymnastics and acrobatics groups for competitions and shows
- Choreograph acrobatics **shows** 📺 and participate in them

TALKS

3D Pre-training improves GNNs

Cambridge CL AI Research Talk 📅 Oct 2021

Self-Supervised learning on Proteins

ICML 2021 WCB 📅 July 2021

Attention predicts Protein Location

ISMB/ECCB 2021 📅 July 2021

Language Models for Protein Prediction

Representation Learning in Biology 📅 July 2021

Contributed talk ICLR'21 MLPCP

ICLR 2021 MLPCP 📅 May 2021

PROJECTS

GraphML Reading Group

LoGaG Reading Group

📅 since July 2021 📍 virtual

- I am organizing the **Learning on Graphs and Geometry reading group** where paper authors present their work with with >50 weekly attendees

Guided Research Computer Vision

Matthias Nießner's CV & AI chair at TUM

📅 Mar 2020 – Sept 2020 📍 Munich, DE

- "Neural Radiance Fields for Novel View and Human Pose Synthesis" (unpublished) with video 📺 explanation and code 🔗

Predict Protein webserver

Rostlab at Technical University of Munich

📅 April 2021 📍 Munich, DE

- Provide the state-of-the-art subcellular localization predictions for the **predict protein webserver**

GNNs for Reinforcement Learning

Technical University of Munich

📅 Nov 2020 – Mar 2021 📍 Munich, DE

- Project in a course: using graph representations of robots in reinforcement learning

📖 "Graph representations in Reinforcement Learning"

Seminar: Topics in machine learning

DAML at Technical University of Munich

📅 April 2020 – Sept 2020 📍 Munich, DE

- 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)

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"