HANNES STÄRK

EECS PhD student at MIT - M.Sc. Informatics from TU Munich

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EDUCATION

PhD in EECS | Machine Learning

Massachusetts Institute of Technology   📅 June 2022 - June 2027

- Co-advised by Prof. Tommi Jaakkola and Prof. Regina Barzilay

M.Sc. Informatics | Machine Learning major

Technical University of Munich   📅 Oct 2019 - Sept 2021

- "passed with high distinction" (1.2) - No corrections for thesis
- Learning theory, ML, DL, Quantum Computing, Protein Prediction, ...
- 📖 Attending theoretical foundations of AI and protein prediction reading groups

B.Sc. Informatics | Mathematics track

Bundeswehr University Munich   📅 Oct 2017 – Sept 2019

- Only student who completed the 3 year curriculum in 2 years
- 📱 Built concept and started development of the app CoachPTBS

EXTRACURRICULAR TRAINING

Machine Learning Summer School: MLSS   📅 Aug 2021
- Strong student award and nominated for best paper (selective admission)

Eastern European ML Summer School: EEML   📅 Jul 2021
- 1 of 4 chosen students to present research (selective admission)

London Geometry and ML Summer School: LOGML   📅 Jul 2021
- GNNs for molecules project with Dr. Wengong Jin (selective admission)

PRAIRIE/MIAI AI Summer School: PAISS   📅 Jul 2021
- Organized two meetups about Graph ML (selective admission)

PREVIOUS CORE RESEARCH PROJECTS

MIT Internship: Geometric DL for Binding Prediction

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

📅 Oct 2021 - Feb 2022   📍 Remote

- SE(3)-invariant prediction of the bound ligand's 3D coordinates: Paper 📄

Master's Thesis on Graph Representation Learning

Pietro Liò, Cambridge University + Stephan Günnemann, TUM

📅 Mar 2021 – Sept 2021   📍 Remote

- Use SSL to pre-train GNNs with 3D information of molecules leading to a 22% average improvement in prediction error: video explanation ▶

Protein Language Models for Protein Prediction

Burkhard Rost, Technical University of Munich

📅 Sept 2020 – March 2021   📍 Remote

- **Developed attention mechanism and architecture for predicting proteins' subcellular location beating SOTA by 8 percentage points:** video ▶

SELECTED PAPERS (find all here: 🎓)

- Stärk, Hannes et al. (2022) "EquiBind: Geometric Deep Learning for Drug Binding Structure Prediction". In: *ICML 2022*. *Spotlight at ICLR'22 MLDD*.
- Stärk, Hannes et al. (2021) "3D Infomax improves GNNs for Molecular Property Prediction". *In: ICML 2022*. *Also at NeurIPS 2021 ML4PH, AI4S, SSL workshops and ELLIS ML4Molecules workshop*.
- Stärk, Hannes et al. (2021) "Light Attention Predicts Protein Location from the Language of Life". In: *OUP Bioinformatics Advances*. *Also at ICLR'21 AI4PH and spotlight at ICLR'21 MLPCP. Poster + talks at MLCSB 2021 and 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   ● ● ● ● ○
Self-Supervised learning, Transformers for proteins, Differentiable rendering, Reinforcement learning, WaveNet for denoising audio, Enzyme prediction + projects done as coursework and exercises created for courses

TensorFlow, Keras   ● ○ ○ ○ ○
Variational Autoencoder for aerial images

Other: Spectral Methods for Graphs, Computer Vision, 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

LEISURE

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

AWARDS

🏆 Highest prize money award at WCB ICML'21
🏆 Strong student award at MLSS

WORK EXPERIENCE

ML Research Intern
Valence Discovery
📅 March 2022 - May 2022   📍 remote   🗂 Part-time
🔑 **Paper (public soon) on drug-target binding affinity prediction**

Mathematics Instructor
BIB Augsburg gGmbH
📅 Feb 2020 - Nov 2021   📍 Augsburg, DE   🗂 Part-time
🔑 **4h workweek: teaching linear algebra, analysis, and statistics**
- Online lectures and weekly individual lessons

Student Assistant
Institute of Mathematics and OR, Bundeswehr University Munich
📅 Sept 2018 – July 2019   📍 Munich, DE   🗂 Part-time
🔑 **10h workweek: causal inference + structure learning in Bayesian networks**
- 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
🔑 **38h workweek: 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
- Taught two recitations per week for 40 students, helped in online forum

Deep Learning
Technical University of Munich, CV & AI Niessnerlab
📅 Nov 2020 – April 2021   📍 Remote   🗂 Part-time
- Held weekly office hours, created exercises and learning material like jupyter notebooks, answered questions in an online forum

VOLUNTEERING AND PAPER REVIEWS

Co-founder and Organizer of the Learning on Graphs Conference
- founded the LoG Conference with Dr. Petar Veličković and Yuanqi Du

Reviewing papers
- IEEE Transactions on Pattern Analysis and Machine Intelligence (1)
- Bioinformatics (1)
- 2021 Machine Learning for Health Symposium (4)

Co-organizer of ML on Graphs Workshop @ WSDM 2022

ICLR 2021 and ICML 2021 Volunteer
- Help presenters and host talks including keynotes

Gymnastics and Acrobatics Trainer
VfL Buchloe
📅 Sept 2015 – May 2022   📍 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 (find all here: 🌐)

Mila - Quebec AI Institute   📅 Jan 2022
Molecular Modelling. Host: Dr. Prudencio Tossou

Twitter Research   📅 Jan 2022
Host: Prof. Michael Bronstein and Fabrizio Frasca

Hong Kong ML meetup   📅 Dec 2021
Invited talk about GNNs for molecules

Technical University of Munich   📅 Nov 2021
Two **guest lectures** about protein prediction for biology and CS students. Host: Prof. Burkhard Rost

University of Cambridge   📅 Oct 2021
AI Research seminar. Host: Prof. Mateja Jamnik

Valence Discovery   📅 Oct 2021
Invited talk. Host: Daniel Cohen

ICLR'21, ICML'21, and NeurIPS'21 Workshops
4 contributed talks for strong papers

ISMB/ECCB 2021   📅 July 2021
Chosen for "Long Talk" on representation learning

RLB Workshop   📅 July 2021
Protein localization. Host: Christian Dallago

PROJECTS

GraphML Reading Group
LoGaG Reading Group
📅 since Aug 2021   📍 virtual
- I am organizing the Learning on Graphs and Geometry reading group where paper authors present their work in an open discussion on Zoom
- >50 weekly attendees and sponsored by Valence

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: graph representations of robots in reinforcement learning: Report 📄 , Code 🎧

Seminar: Topics in machine learning
DAML at Technical University of Munich
📅 April 2020 – Sept 2020   📍 Munich, DE
- I wrote a survey on Transformers and reviewed the papers of three other students: My survey 📄

Bachelor's Thesis
Bundeswehr University Munich
📅 May 2019 – Sept 2019   📍 Munich, DE
- Implemented a variational autoencoder and developed methods for interpolating in the latent space and interpreting + visualizing it: Bachelor's thesis