HANNES STÄRK

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

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EDUCATION

PhD in EECS | Machine Learing
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)

PAST 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". *Under review.*
- Stärk, Hannes et al. (2021) "3D Infomax improves GNNs for Molecular Property Prediction". *Under review. Also accepted 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. 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 LEARN-ING and especially GRAPH REPRESEN-TATION LEARNING. I have hands-on ex-perience from academia + industry and am now fully devoted to research. My main expertise revolves around symme-try 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 (pro-ficient) R, C++, SQL, ARM assembly, Swift, MATLAB (used occasionally)

PyTorch   ●●●●○
Self-Supervised learning, Transformers for pro-teins, 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, 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
🏆 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