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

SELECTED PAPERS (find all here:)

- Gabriele Corso*, **Stärk Hannes*** et al. (2022) "EquiBind: Geometric Deep Learning for Drug Binding Structure Prediction". In: ***ICML 2022***. *Spotlight at ICLR'22 MLDD.*
- Stärk et al. (2022) "EquiBind: Geometric Deep Learning for Drug Binding Structure Prediction". In: ***ICML 2022***. *Spotlight at ICLR'22 MLDD.*
- Stärk 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 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 a first-year PhD student at MIT CSAIL co-advised by Tommi Jaakkola and Regina Barzilay. I work on ***GEOMETRIC DEEP LEARNING****, physics-inspired ML and applications in* ***MOLECULAR BIOLOGY*** *and* ***PHYSICS****. I aim to use ML to model complex systems that cannot be captured by simple equations. This is with the purpose of improving our understanding of the world and to help tackle* ***IMPACTFUL*** *real-world problems.*

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 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