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

- "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

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 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 | Cambridge, MA | Full-time

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

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 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 – 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". *Under review. Also accepted at NeurIPS 2021 ML4PH, AI4S, SSL workshops and ELLIS ML4Molecules workshop.*
- Kefato, Z.; Stärk, Hannes et al. (2021) "Jointly Learnable Data Augmentations for Self-Supervised GNNs". In: *Under review. Accepted at NeurIPS 2021 SSL*
- 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 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

Mathematics Instructor

BIB Augsburg gGmbH

since Feb 2020 | Augsburg, DE | Part-time

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

Causal inference for train traffic + 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

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

VOLUNTARY WORK

Reviewer for ML4H 2021 Symposium

2021 Machine Learning for Health Symposium

Sept 2021 - Oct 2021 | Remote | Part-time

- Review four papers on graph representation learning and time series analysis

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

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
Research Talk. Host: Daniel Cohen

ICML 2021 WCB — July 2021
Contributed talk for top 4 paper

ISMB/ECCB 2021 — July 2021
Presented a "Long Talk" on representation learning

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

ICLR 2021 MLPCP — May 2021
Contributed talk for top paper at workshop

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 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: 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 variational autoencoder and developed methods for interpolating in the latent space and interpreting + visualizing it: Bachelor's thesis