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 ●●●●○

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 remote sensing images

Other: Spectral Methods for Graphs, Audio processing, Robotics, Computer Vision and Graphics, 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

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 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

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"