Lukas Gosch

18/5/1993 | Citizenship: Austrian

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EDUCATION

PHD MACHINE LEARNING
TECHNICAL UNIVERSITY OF MUNICH
January 2022 - now
- Topic: Trustworthy Graph Machine Learning
- Supervised by Prof. Stephan Günnemann
- Part of the Konrad Zuse School of Excellence in Reliable AI

MSC COMPUTATIONAL SCIENCE
UNIVERSITY OF VIENNA
March 2018 - July 2021
- Focus: Machine Learning and Optimization
- Performance scholarship
- Price for best Master's thesis
- GPA: 1.0 (1 best, 5 worst)

BSC TECHNICAL PHYSICS
TECHNICAL UNIVERSITY OF VIENNA
September 2013 - September 2017
- Bachelor's thesis on a C++ data analysis project in high energy physics
- GPA: 1.9 (1 best, 5 worst)

HIGHER SCHOOL CERTIFICATE
HTL ST. PÖLTEN, DEPARTMENT OF INFORMATICS
September 2007 - June 2012
- Focus on application programming in Java
- GPA: 1.0 (1 best, 5 worst)

TEACHING

TECHNICAL UNIVERSITY OF MUNICH
MASTER THESES SUPERVISED
- *Training Node-Level Differentially Private Graph Neural Networks with Random Walks*
- *Robustness of Graph Property Predictions using Higher-Order Graph Neural Networks*
- *Learnable Diffusion for Improved Structural Robustness of Graph Neural Networks*

COURSE INSTRUCTOR
- Machine Learning (ML) for Graphs and Sequential Data (2022S)
  - Responsible for Robust ML Unit
- Machine Learning (2022 & 23WS)
  - Resp. for Optimization & SVM Units
- Selected Topics in ML Research (2023S)
  - Guiding Student Seminar Works

RESEARCH EXPERIENCES

MACHINE LEARNING

TECHNICAL UNIVERSITY OF MUNICH
PHD STUDENT, DATA ANALYTICS AND MACHINE LEARNING (DAML) GROUP
January 2022 - now | Munich, Germany
Basic research on the mathematical and algorithmic foundations of (reliable) graph machine learning

Research Topics:
- Robustness of Deep (Graph) Learning
- Privacy-Preserving (Graph) Machine Learning
- Graph Neural Networks

INSTITUTE OF SCIENCE & TECHNOLOGY AUSTRIA
RESEARCH INTERNSHIP, MACHINE LEARNING AND COMPUTER VISION GROUP
October 2019 - April 2020 | Vienna, Austria
Basic research in machine learning | Technical Report
- Information-theoretic approaches for deep self-supervised representation learning

FRAUNHOFER INSTITUTE FOR ALGORITHMS & SCIENTIFIC COMPUTING
RESEARCH INTERNSHIP, NUMERICAL DATA DRIVEN PREDICTION RESEARCH GROUP
July 2018 – September 2018 | Bonn, Germany
Python - Machine learning in cyber-physical systems
- Topological data analysis applied to time series

QUEEN'S UNIVERSITY BELFAST
RESEARCH INTERNSHIP, SCHOOL OF PSYCHOLOGY
July 2017 – August 2017 | Northern Ireland, UK
Matlab - Ball trajectory reconstruction from 3D markers

OPTIMIZATION

AIT AUSTRIAN INSTITUTE OF TECHNOLOGY
MASTER THESIS, INTEGRATED TRANSPORT OPTIMIZATION
July 2020 – June 2021 | Vienna, Austria
Combinatorial optimization applied in green logistics
- Won price for best Master's thesis from the Austrian Society of Operations Research (ÖGOR)
- Presented and published at the IPIC2021 conference
- Mathematical modelling introducing a novel network design problem
- Exact and heuristic solving using integer linear programming and hybrid heuristics (C++)

2008 - 2018 | Further employments

PUBLICATIONS

- **Lukas Gosch***, Simon Geisler*, Daniel Sturm*, Bertrand Charpentier, Daniel Zügner, Stephan Günnemann "**Adversarial Training for Graph Neural Networks**" NeurIPS 2023
- Francesco Campi, **Lukas Gosch**, Tom Wollschläger, Yan Scholten, Stephan Günnemann "**Expressivity of Graph Neural Networks Through the Lens of Adversarial Robustness**" AdvML @ ICML 2023
- **Lukas Gosch**, Daniel Sturm, Simon Geisler, Stephan Günnemann "**Revisiting Robustness in Graph Machine Learning**" ICLR 2023, also TSRML & ML Safety @ NeurIPS 2022
- Morgane Ayle, Jan Schuchardt, **Lukas Gosch**, Daniel Zügner, Stephan Günnemann "**Training Differentially Private Graph Neural Networks with Random Walk Sampling**" , TSRML@NeurIPS 2022
- **Lukas Gosch**, Matthias Prandtstetter, Karl F. Doerner "**On Modelling and Solving Green Collaborative Transportation Planning**" IPIC2021
- Roman Feldbauer, **Lukas Gosch**, Lukas Lüftinger, Patrick Hyden, Arthur Flexer, Thomas Rattei "**DeepNOG: fast and accurate protein orthologous group assignment**" Bioinformatics 2020

* . . . equal contribution

SOFTWARE

DEEPNOG

Open source software tool leveraging a deep convolutional neural network for protein similarity search.

- Published in Bioinformatics
- Link: https://github.com/univieCUBE/deepnog

Developed during a study-project in the Computational Systems Biology research group at the University of Vienna.

REFERENCES

Upon Request

FURTHER ACTIVITIES

CONFERENCES

- NeurIPS 2023 (Poster)
- ICLR 2023 (Poster)
- NeurIPS 2022 (Contributed Talk @ TSRML)
- (virtual) ICLR 2022
- (virtual) ICLR 2021
- (virtual) IPIC 2021 (Talk, Master's thesis work)
- ALGO 2017 (volunteer)
- 66th Annual Meeting of the Austrian Physical Society 2016 (Talk, Bachelor's thesis work)

Reviewer

- SynS & ML @ ICML 2023 workshop

BOOK CLUBS

DAML Reading Group | 2022 - now

- Read "High-Dimensional Statistics: A Non-Asymptotic Viewpoint" by M. Wainwrigth
- Read "The Theory of Statistics and Its Applications" by D. Cox

Scientific Writing | 2019 - 2020

- With colleagues from IST Austria

Classic Literature & Philosophy | 2017 - 2021

- Founder
- Book list: https://saper0.github.io/lesekreis/

STUDENT REPRESENTATIVE

Konrad Zuse School of Exzellence in Reliable AI (Graduate School)
2022 - 2023

- Organization of Social Events
- Organization of a Journal Club

ATTENDING OF LECTURES AND EVENTS

On philosophy, ethics and machine learning
Examples

- Ethics & Bias in AI - Vienna Deep Learning Meetup
- Philosophy courses - University of Vienna

SKILLS

PROGRAMMING

Most experienced with:

- Python (PyTorch, PyG, NumPy, scikit-learn)
- C++
- LaTeX

Some experience with:

- Java, R, Matlab, C, SQL
- Git, CPLEX, Linux

LANGUAGES

German | Native
English | Advanced (Level C1)

- IELTS band score 8