

Alexandru Meterez

<https://alexandrumeterez.github.io>

+40742433367 · alexandrumeterez@gmail.com · alexandru.meterez@inf.ethz.ch

Research Interests

Theoretical: Deep Learning theory, Optimization, Theory of Large Language Models

Applications: AI in Healthcare, Bioinformatics

Education

ETH Zürich

MSc Data Science

Zürich, Switzerland

2020 - Present

- *Advisors:* Prof. Gunnar Rätsch, Prof. Francesco Orabona (KAUST)
- *GPA:* 5.7/6
- *Thesis topic:* Avoiding gradient explosion in orthogonal neural networks with batch normalization
- *Selected courses:* Advanced Machine Learning, Fundamentals of Mathematical Statistics, Computational Biology, Statistical Models in Computational Biology

University Politehnica of Bucharest (UPB)

BSc Computer Science

Bucharest, Romania

2016 - 2020

- *Advisor:* Prof. Iuliu Vasilescu
- *GPA:* 9.58/10 (top 7%)
- *Selected courses:* Probability and Statistics, Linear Algebra, Signal Processing, Numerical Methods, Data Structures and Algorithms, Algorithm Design, Programming Paradigms

Research

Publications

[THY] Towards Training Without Depth Limits: Batch Normalization Without Gradient Explosion

ICLR 2024

Alexandru Meterez*, A. Joudaki*, F. Orabona, A. Immer, G. Rätsch, H. Daneshmand

- » Theoretically proving that very deep feed-forward neural networks with batch normalization layers initialized with orthogonal weight matrices have bounded gradients at infinite depth.

[BIO] Aligning Distant Sequences to Graphs using Long Seed Sketches

RECOMB 2023 & Genome Research (2023): gr-277659.123

A. Joudaki*, **Alexandru Meterez***, H. Mustafa, R. Groot Koerkamp, A. Kahles, G. Rätsch

- » Designed a novel seeding algorithm based on tensor sketching for aligning highly mutated queries to De Bruijn graphs in quasi-logarithmic time.
- » Work published at *RECOMB2023* and received an invitation for the *Journal of Genome Research*.

[APP] Towards Workflows for the Use of AI Foundation Models in Visual Inspection

Applications

EUROSTRUCT 2023

M. Rigotti, D. Antognini, R. Assaf, K. Bakirci, T. Frick, I. Giurgiu, K. Janoušková, F. Janicki, H. Jubran, C. Malossi, **Alexandru Meterez**, F. Scheidegger

- » An application of Foundation Models to one-shot detection of various key civil infrastructure components from drone images.

*: Equal first authors

Labels correspond to: [BIO] - bioinformatics, [APP] - applications, [THY] - theory.

Experience

Max Planck Institute for Intelligent Systems (MPI Tübingen)

Research Intern

Tübingen, Germany

Nov. 2023 - Feb. 2024

- » Research in Deep Learning theory, specifically on the optimization landscape of models under Maximal Update Parametrization (μP), supervised by Dr. Antonio Orvieto.

IBM Research*Research Intern*

Zürich, Switzerland

Sept. 2022 - Feb. 2023

- » Used Neural Radiance Fields to inspect civil infrastructure for defects in the 3D domain and segment the defects on the surfaces, supervised by Dr. Florian Scheidegger and Dr. Cristiano Malossi.

Adobe*Software Engineering Intern*

Bucharest, Romania

Jul. 2019 - Oct. 2019

- » Built the Frontend Regression Validator (FRED), a tool that uses deep learning for visual regression testing the layout of a website between deployments, supervised by Dr. Tiberiu Boros.
- » Deployed FRED using Docker and built a web-based graphical user interface.

CAMPUS Research Institute, UPB*Student Researcher*

Bucharest, Romania

Jul. 2018 - Jul. 2020

- » Worked on computer vision for robotics, supervised by Prof. Iuliu Vasilescu.

Sparktech Software*Software Engineering Intern*

Bucharest, Romania

Jul. 2018 - Oct. 2018

- » Used NLP to build a recommender system for users in a social media platform designed for researchers.
- » Used Kafka and Redis to connect the inference process between backend and frontend.

Teaching Experience

Big Data & Big Data for Engineers, ETH Zürich*Teaching Assistant for 100+ students*

Zürich, Switzerland

2021 and 2022

Wrote exercises, held weekly teaching sessions and worked on [RumbleDB](#). Courses taught by Prof. Ghislain Fourny.

Analog Electronics & Digital Electronics, UPB*Teaching Assistant for 50+ students*

Bucharest, Romania

2018 and 2019

Wrote exercises, held weekly teaching sessions and built electronic circuits. Courses taught by Prof. Iuliu Vasilescu.

Awards

Grade I Scholarship

2017

Granted by UPB to students with the best grades in the year ($\text{GPA} \geq 9.5$).

Performance Scholarship

2018

Granted by UPB to students with the best grades in the year ($\text{GPA} \geq 9.7$) that participated in extracurricular research and contests.

3rd place at the Robotics Student Science Fair

2018

Granted by UPB for building a system that a drone can use to plot its trajectory using optical flow, combining data from several sensors using a Kalman filter.

Qualified at the Romanian National Mathematics Olympiad

2014 and 2015

Qualified in high-school during my 11th grade and 12th grade.

Volunteering

CaCTüs Internship at MPI Tübingen

2024 (summer)

Project advisor for CaCTüs at MPI, addressed to talented students with financial or societal constraints.

References

Prof. Gunnar Rätsch, ETH Zürich

Contact: raetsch@ethz.ch

Prof. Francesco Orabona, KAUST

Contact: francesco.orabona@kaust.edu.sa

Prof. Iuliu Vasilescu, UPB

Contact: iuliu.vasilescu@cs.pub.ro