

Lorenzo Bini

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Education

University of Geneva , Ph.D. Candidate - Department of Computer Science & CUI	Nov 2022 – Ongoing
• Major: Artificial Intelligence and Machine Learning.	
Polytechnic of Turin , Master of Science in Physics of Complex Systems	Sep 2020 – Sep 2022
• GPA: 4.0/4.0	
Alma Mater Studiorum - University of Bologna , Bachelor degree in Physics & Astronomy Systems	Sep 2017 – Sep 2020
• GPA: 3.8/4.0	

Experience

Research Assistant , Hôpitaux Universitaires de Genève (HUG) – Geneva, Switzerland	Nov 2022 - Ongoing
• Working on detecting Minimal Residual Disease (MRD) of Acute Lymphoblastic and Myeloid Leukemia from Flow Cytometry data.	
• Developing deep learning methods for single-cells hierarchical classification, under weak/self-supervised scenarios.	
Teaching Assistant , University of Geneva – Department of Computer Science & CUI	Nov 2022 – Ongoing
• Introduction to Computational Finance - 14X030 ;	
• TALN: Traitement de la langue approches linguistiques et approches empiriques (NLP) - 34C2161 ;	
• Information Retrieval - 14X060 ;	
• Data Science - Analyse et Traitement de l'Information - 14X026 ;	
• Selected Chapters - Game Theory - 14X060 ;	
Research Assistant , University of South-Eastern Norway - USN	Feb 2022 - July 2022
• Working on quantum theory for the entanglement and non-locality in optomechanics continuous variable systems, under the co-supervision of Prof. Francesco Pietro Massel and Prof. Vittorio Penna - Quantum Technology Group .	

Publications

Characterizing Massive Activations of Attention Mechanism in Graph Neural Networks	Oct 2024
<i>Lorenzo Bini</i> , Marco Sorbi, Stéphane Marchand-Maillet	
Pre-print, under double-blind review as a conference paper	
Injecting Hierarchical Biological Priors into Graph Neural Networks for Flow Cytometry Prediction	Jul 2024
<i>Lorenzo Bini</i> , Fatemeh Nassajian Mojarrad, Stéphane Marchand-Maillet	
ICML'2024 Workshop on Accessible and Efficient Foundation Models for Biological Discovery, Wien, Austria	
FlowCyt: A Comparative Study of Deep Learning Approaches for Multi-Class Classification in Flow Cytometry Benchmarking	Jun 2024
<i>Lorenzo Bini</i> , Fatemeh Nassajian Mojarrad, Margarita Liarou, Thomas Matthes, Stéphane Marchand-Maillet	
Conference on Health, Inference, and Learning (CHIL'24), New-York, NY.	
Why Attention Graphs Are All We Need: Pioneering Hierarchical Classification of Hematologic Cell Populations with LeukoGraph	Feb 2024
<i>Lorenzo Bini</i> , Fatemeh Nassajian Mojarrad, Thomas Matthes, Stéphane Marchand-Maillet	

[arXiv:2402.18610](https://arxiv.org/abs/2402.18610)

HemaGraph: Breaking Barriers in Hematologic Single Cell Classification with Graph Attention

Dec 2023

Lorenzo Bini, Stéphane Marchand-Maillet

[arXiv:2402.18611](https://arxiv.org/abs/2402.18611)

Awards & Oral Presentations

PhD Symposium - CHIL'24 at Cornell Tech University, NY

Jun. 2024

- Winner of the PhD Symposium money-prize to attend and present my PhD work "Adversarial Robust GNNs: Enhancing Learning with Knowledge Injection in Tabular Data" at [CHIL'24](#), conference held by Cornell Tech University, New York.

CHAIR Structured Learning Workshop - Chalmers University of Technology

Oct. 2023

- Oral presentation of the "Knowledge Distillation in Acute Myeloid Leukemia Classification: Tabular Data Meets Graph Neural Networks" poster at the [AI Structured Learning 2023 Workshop](#) in Göteborg, Sweden.

Winner of Thesis on Proposal 2021/2022

Feb. 2022

- Winner of "Thesis on Proposal 2021/2022" call for bids for my Master's Thesis on "Entanglement and non-locality in optomechanics continuous variable systems" under the supervision of Prof. Francesco Pietro Massel & Prof. Vittorio Penna.
- Received grants for my research period at USN-Kongsberg.

Projects

Flow Cytometry Deep Learning Benchmark

[FlowCyt-Benchmark](#)

- Developed the first public available deep learning benchmark for single-cell classification and clustering on flow cytometry data. Tested on a cohort of 30 selected patients by expert hematologists, from bone marrow and peripheral blood. Benchmarkd SOTA classification methods like DNNs, GNNs, XGBoost, RandomForest, and Gaussian Mixture Models.
- Tools Used: Python, CSS, HTML.

Kaggle/LeetCode Competitions

2021 - Ongoing

- Regular participation on different Kaggle and LeetCode competitions.
- Tools Used: Python - Competitive Programming.

Math/Physics Olympiad

Sep 2014 - Sep 2019

- 2x winner of the Italian Regional Math Olympiad.
- 1x winner of the Italian Regional Physics Olympiad.
- Time Period: team competitions, over the last three years of high school and bachelor.

Visiting Student, City Montessori School, Lucknow - Uttar Pradesh, India USN

Aug 2016 - Sep 2016

- Visited the City Montessori School together with the Italian cultural association "CinemíCinéma" to provide help and needs to elementary/mid school students.

Oxfam Volunteering

2016 - Ongoing

- I do regularly serve as volunteer for charity organization, such as [Oxfam Italy](#).

Technologies

Languages and coding: Python, Julia, R, Bash (Shell), Matlab, Mathematica.

- **AI/ML:** Pytorch, Tensorflow, Keras, Lightning, scikit-learn, Git, Github, GitLab, Conda, Numpy, Pandas, Matplotlib, Seaborn, Jupyter, Docker, SciPy, wandb, PyG.

Technologies: Kaluza Analysis Software, Zemax OpticStudio | Comprehensive Optical Design Software, TeXstudio, BioVinci Software.