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 classifcation, 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

Lorenzo Bini, 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

Lorenzo Bini, 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

Lorenzo Bini, 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

Lorenzo Bini, Fatemeh Nassajian Mojarrad, Thomas Matthes, Stéphane Marchand-Maillet

[arXiv:2402.18610](#)

HemaGraph: Breaking Barriers in Hematologic Single Cell Classification with Graph Attention   Dec 2023

Lorenzo Bini, Stéphane Marchand-Maillet

[arXiv:2402.18611](#)

Awards & Oral Presentations

PhD Symposium - CHIL'24 at Cornell Tech University, NY   Jun. 2024

- Selected to 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 Götebor, Sweden.

Winner of Thesis on Proposal 2021/2022   Feb. 2022

- I won the "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

- I do regularly partecipate in different Kaggle and LeetCode competitions.
- Tools Used: Python - Compatitive Programming.

Math/Physics Olympiad   Sep 2015 - Sep 2019

- I participated and won twice the Italian Regional Maths/Physics Olympiad, during my last three years in high school and bachelor.

Visiting Student, City Montessory School, Lucknow - Uttar Pradesh, India USN   Aug 2016 - Sep 2016

- Visited the City Montessory School together with the italian cultural association "CinemíCinemá" 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.