Alessandro Pierro / Ph.D. Student

Based in Munich, Germany / Scholar / GitHub / LinkedIn

I am a first-year Ph.D. student working on hardware-aware machine learning and optimization, with a focus on neuromorphic and compute-memory integrated platforms.

Education

Doctorate in Computer Science / Ludwig-Maximilians-Universität München

OCT 2023 - PRESENT, MUNICH (GERMANY)

Expected graduation date: beginning of 2027

Research on hardware acceleration of machine learning and optimization algorithms at the edge, applying the methodology to the Intel Loihi 2 chip. The project is funded by Intel Labs and supervised by Prof. Eyke Hüllermeier.

M.Sc. in Data Science and Science (cum laude) / University of Trieste, SISSA, and ICTP

OCT 2021 - SEP 2023, TRIESTE (ITALY)

Thesis on hardware-accelerated simulated annealing, funded by Intel Labs and supervised by Prof. Lorenzo Castelli.

Courses in algorithm design, parallel programming and HPC, machine learning, probabilistic modeling, deep learning, kernel methods, data visualization, mathematical optimization, and information retrieval.

B.Sc. in Mathematics (cum laude) / University of Modena and Reggio Emilia

SEP 2018 - JUL 2021, MODENA (ITALY)

Thesis on direct collocation methods for trajectory optimization, supervised by Prof. Marco Prato.

Courses in real analysis, linear algebra and geometry, numerical analysis and optimization, probability and statistics, data structures and algorithms, measure theory, and mathematical physics.

Professional Experience

Intel Labs / Algorithms Researcher

OCT 2022 - PRESENT, MUNICH (GERMANY)

Part of the core Lava development team, the Intel open-source neuromorphic computing library, designing and implementing algorithms with Python, C and Assembly for the Intel Loihi 2 neuromorphic chip.

Oslo Metropolitan University / Research Assistant

AUG 2022 - OCT 2022, OSLO (NORWAY)

Developed an evolutionary algorithm to characterize and optimize a hydrodynamical computational reservoir, which improved its separation capabilities for supervised learning tasks by 100x. Work presented at GECCO 2023.

University of Trieste / Research Intern

JAN 2022 - JUN 2022, TRIESTE (ITALY)

Combined evolutionary algorithms and reinforcement learning to teach locomotion to modular soft robots directly from perception data. I implemented the algorithms in Java and used the 2dhmsr simulator for the experiments.

Modena Racing Driverless / Localization and Planning Developer

OCT 2019 - JUL 2021, MODENA (ITALY)

Won the “Autonomous Design” prize at IMechE Formula SAE (Silverstone, 2021), an international competition in vehicle engineering, where I collaborated in developing a Model Predictive Controller using C++ and ROS2.

Publications

- Yik, Jason, et al. "Neurobench: Advancing neuromorphic computing through collaborative, fair and representative benchmarking." *Under review*.
- Pierro, Alessandro, et al. "Optimization of a hydrodynamic computational reservoir through evolution." *Proceedings of the Genetic and Evolutionary Computation Conference*. 2023.

Invited Talks

- Neuromorphic acceleration for combinatorial optimization
  University of Trieste, course of Operations Research (Apr 2024, Trieste IT)

- Hands-on neuromorphic computing with Lava and Intel Loihi 2
  3rd AutoML Fall School (Nov 2023, Munich DE)

Academic Service and Contributions

- Reviewer for the *Journal of Open Source Software (JOSS)* since 2024.
- Maintainer of SHAP-IQ, an open-source Python library for explainable AI.

Awards & Scholarships

M.Sc. Scholarship / Collegio Universitario Luciano Fonda

OCT 2021 - SEP 2023, TRIESTE (ITALY)

Two-year scholarship assigned to 5 outstanding students of the Dept. of Mathematics and Geoscience (≈ top 2%), offering training opportunities (technical and soft skills), accommodation, and support for international mobility.

Study Award / University of Modena and Reggio Emilia

2018 & 2019, MODENA (ITALY)

Annual prize awarded to the top 5% of undergraduate students with the highest GPA in the university.

Languages

Italian (native), English (fluent), and Spanish (beginner).