Alessandro Lonardi
Assistant AI Researcher, Sony AI

Last update: July 6, 2024

Contact Information

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Research

Machine Learning Methods and Machine Learning for Science:

Mathematical Optimization, Optimal Transport, Routing Algorithms
Discrete optimal transport on graphs: advancements in theory, efficient algorithms, and applications to machine learning and science, from supervised classification to engineering networks. Pathfinding algorithms.

Probabilistic Modelling: Inference on Graphical Models
Bayesian inference methods: belief-propagation algorithms for inference and community detection. Generative graph modeling.

Complex Systems
Modeling of emergent phenomena in complex systems: community detection, network efficiency, and robustness, hypergraphs.

Experience

Assistant AI Researcher at Sony AI — Jul, 2024 – Dec, 2024

Guest Researcher at the Max Planck Institute for Intelligent Systems — Jan, 2024 – Aug, 2024

Head, co-founder at Commute — Oct, 2022 – Apr, 2023
Startup for data-driven solutions for efficient and sustainable transportation.

Research Intern at the Max Planck Institute for Intelligent Systems — Jan, 2020 – Aug, 2020

Education

Max Planck Institute for Intelligent Systems — Sep, 2020 – Dec, 2023
IMPRS-IS: International Max Planck Research School
PhD in Computer Science (magna cum laude)
Advisor: Caterina De Bacco (Max Planck Institute for Intelligent Systems)

Università degli Studi di Padova — Oct, 2015 – Jul, 2020
MSc in Mathematical Engineering: Mathematical Modelling for Engineering and Science (cum laude)
BSc in Physics

Coding & Tools

Programming Languages (advanced, $>$ 6 years): Python (Numpy, Scipy, Pandas, Matplotlib, Scikit-learn)
Programming Languages (intermediate-basic): Python (PyTorch), MATLAB, C++, Mathematica
Tools: Git, cluster computing management: HTCondor, LaTeX, HTML, CSS, scientific presentation suites, MacOS, Debian/Arch-based Linux distros

Teaching

Tübingen University: Advanced Probabilistic Machine Learning and Applications. Master's program in Machine Learning (2 terms: 2020, 2021)

Languages

Italian (native), English (fluent), German (intermediate, learning), Spanish (basic)

Selected Recent Publications (form 7 peer-reviewed)

Lonardi, De Bacco, Bilevel Optimization for Traffic Mitigation in Optimal Transport Networks, Physical Review Letters (2024), 10.1103/PhysRevLett.131.267401

Ruggeri*, **Lonardi***, De Bacco, Message-Passing on Hypergraphs: Detectability, Phase Transitions and Higher-Order Information, Journal of Statistical Mechanics: Theory and Experiment (2024) 10.1088/1742-5468/ad343b
(* = equal contribution)

Review Service

Journals/Conference (# rev.): PRE (1), J. of Phys. Comm. (3), Physica Scripta (2), SysDo 2024 (1)

Talks

2 talks at Netsci 2023 (flagship conference in network science) | 2 talks at academic seminars | 4 talks at MPI IS scientific events

Volunteering

University orientation for high schoolers: Career perspectives in AI, 2024, Verona, Italy (calabreselevi.edu.it)
Volunteer for TReND in Africa Python Workshop 2022, online (trendinafrica.org)
Volunteer for Pint of Science Italia 2016 – 2017, Padua, Italy (pintofscience.it)

Other relevant interests

XAI, Inference vs. mechanistic modeling in science, coding best practices, efficient problem-solving, personal finance, AI and art