

Alberto Foresti

✉ alberto.foresti.01@icloud.com | 🌐 albertoforesti.github.io | I am a last year PhD student in machine learning. My main interests are **continuous and discrete diffusion models, information theory, optimal transport, Schrödinger bridges, probability and statistical physics** with applications in generative modeling.

Experience

EURECOM

Antibes, France

PHD RESEARCHER, ADVISED BY PIETRO MICHIARDI AND GIULIO FRANZESE

Sep. 2024 - exp. 2027

- **Information estimation with discrete diffusion:** proposed INFO-SEDD, a discrete diffusion-based estimator of mutual information and entropy for high-dimensional discrete data; outperforms SOTA estimators and unlocks applications in genomics and sumary evaluation. *First author, ICLR 2026.* 📄 code
- **Thermodynamic sampling schedules:** derived optimization-free schedules for uniform discrete diffusion from entropy production, dynamical activity and a variational form of the discrete 1-Wasserstein distance; on a 7B diffusion LM they match the uniform schedule on MBPP with up to half the function evaluations. *First author, under review at the PriGM workshop at NeurIPS 2026.*
- **Benchmarking mutual information estimation:** unified existing benchmarks under a copula-theoretic framework and built a suite of synthetic, flow-based and real-image tasks; showed that no estimator class (non-parametric, discriminative, generative) dominates and identified the failure modes of each. *First author; under review at JMLR.* 📄 code
- **Optimal noise allocation for diffusion training:** co-developed a theory showing that, under convexity, the optimal training schedule concentrates on finitely many noise levels. *Co-author, with Radboud University and Sony AI.*
- Mentored students in the Advanced Statistical Inference course and supervised semester projects
- Contributed to the MUSECOM2 project in collaboration with the University of Oulu, Bosch and the Czech Technical University in Prague

EURECOM

Antibes, France

RESEARCH INTERN

Mar. 2024 - Jul. 2024

- Conducted fundamental research on functional diffusion models, synthesizing the experimental results and theoretical findings into a comprehensive master's thesis

Publications

CONFERENCE PROCEEDINGS

Information Estimation with Discrete Diffusion

Alberto Foresti, Giulio Franzese, Pietro Michiardi

International Conference on Learning Representations, 2026

INFO-SEDD: Continuous Time Markov Chains as Scalable Information Metrics Estimators

Alberto Foresti, Giulio Franzese, Pietro Michiardi

ICLR 2025 Workshop on Deep Generative Model in Machine Learning: Theory, Principle and Efficacy, 2025

WS2: Weakly Supervised Segmentation using Before-After Supervision in Waste Sorting

Andrea Marelli, **Alberto Foresti**, Leonardo Pesce, Giacomo Boracchi, Mario Grosso

Proceedings of the IEEE/CVF International Conference on Computer Vision (ICCV) Workshops, 2025

PREPRINTS

From Atoms to Entropy: Optimal Noise Allocation for Diffusion Training in the Convex Regime

Luca Ambrogioni, Giulio Franzese, **Alberto Foresti**, Gabriel Raya, Bac Nguyen, Georgios Batzolis, Yuhta Takida, Naoki Murata, Chieh-Hsin Lai, Yuki Mitsufuji

arXiv preprint arXiv:2607.20540 (2026). 2026

Improved Sampling Schedules for Discrete Diffusion Models

Alberto Foresti, Mustapha Bounoua, Giulio Franzese, Luca Ambrogioni, Pietro Michiardi

arXiv preprint arXiv:2602.06849 (2026). 2026

Towards Diverse and Comprehensive Benchmarks for Mutual Information Estimation

Alberto Foresti, Ivan Butakov, Alexander Tolmachev, Giulio Franzese, Alexey Frolov, Pietro Michiardi

arXiv preprint arXiv:2607.03487 (2026). 2026

Skills

Programming

Python, C, Java, Matlab, Git

Machine Learning Frameworks

PyTorch, Scikit-learn, Accelerate, Transformers, Diffusers

Languages

Italian (mother tongue), English (C1), French (B2), Spanish (A2)

Education

Polytechnic of Turin

Turin, Italy

MSC. IN DATA SCIENCE AND ENGINEERING

Sep. 2022 - Jul. 2024

- Relevant coursework: machine learning, deep learning, statistics, information theory, natural language processing, big data, learning theory, optimization on networks, graph theory, artificial intelligence, data ethics, data protection
- Final grade: 110/110 cum laude

Polytechnic of Turin and Polytechnic of Milan

Turin and Milan, Italy

ALTA SCUOLA POLITECNICA

Dec. 2022 - Sep. 2024

- Honours program for the best 160 students of the Polytechnic of Turin and of the Polytechnic of Milan
- Developed weakly supervised segmentation methods for waste sorting applications , directly contributing to a co-authored publication at the ICCV 2025 Workshops

Polytechnic of Turin

Turin, Italy

B.S. IN COMPUTER ENGINEERING

Sep. 2019 - Jul. 2022

- Completed the *Percorso talenti* honours program for the best 200 students in my cohort
- Final grade: 110/110

Awards

2026 **Top Reviewer**, Conference on Neural Information Processing Systems (NeurIPS 2026)