Martino **Ciaperoni**

Postdoctoral Researcher

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Summary

Postdoctoral researcher at Scuola Normale Superiore, Italy. Research has appeared in leading venues across data mining, data management, machine learning, and artificial intelligence. Current research focuses on explainable and trustworthy AI, evaluation and explanation of large language model behavior, and applications of AI to scientific discovery.

Research Experience

Data Science and Human-centered AI Group & KDD Lab — Scuola Normale Superiore

Pisa, Italy

Postdoctoral Researcher · PI: Prof. Fosca Giannotti *2025 – present*

- Research on explainable and trustworthy AI, with a focus on large language model behavior and applications to scientific discovery.
- Work Package and Task Leader for the *ERC PoC ILLUME-4-Science* project; contributor to technology transfer (TRL 3 to TRL 5) and industrial collaborations, including ongoing work with *Accenture* on evaluation metrics for large language model explanations.

Aalto University

Espoo, Finland

Postdoctoral Researcher · PI: Prof. Heikki Mannila *2023 – 2025*

- Research on dimensionality reduction, low-rank approximation, clustering, and linear-algebraic methods for machine learning.
- Contributed to an industrial collaboration with *Helen Oy* and *House of AI* on forecasting district-heating consumption using real-world data, with a first-author paper currently under review at AAAI 2027.

Data Mining Group — Aalto University

Espoo, Finland

Doctoral Researcher · PI: Prof. Aristides Gionis *2019 – 2023*

- Research on efficient and trustworthy algorithms for data mining and machine learning, within the project *Model Management Systems: Machine Learning meets Database Systems*.
- Research visits to Aarhus University, Denmark (2022) and KTH Royal Institute of Technology, Sweden (2023).
- Awarded the Aalto Doctoral Incentive Scholarship (2023, €2,000) and the Nokia Foundation Scholarship (2022, €5,000) recognizing high-quality doctoral research and rapid progress.

Algorithmic Data Analytics Group — ISI Foundation

Turin, Italy

Research Intern and Master's Thesis Student · PI: Dr. Francesco Bonchi *2018 – 2019*

- Research on temporal network analysis, focusing on extracting dense substructures and understanding spreading dynamics.

Education

Aalto University

Espoo, Finland

D.Sc. (Tech.) in Computer Science · Advisor: Prof. Aristides Gionis *2024*

- Thesis: *Efficient and Trustworthy Methods for Knowledge Discovery*.

Sapienza University of Rome

Rome, Italy

M.Sc. in Data Science *2019*

- 110/110 cum laude (average grade 30/30).
- Thesis: *Applications of the Temporal Core Decomposition in the Analysis of Temporal Networks* (Supervisors: Dr. Francesco Bonchi and Prof. Stefano Leonardi).

University of Bologna & University of Glasgow

Bologna, Italy & Glasgow, UK

B.Sc. in Statistics · B.Sc. (Hons) in Statistics — Double Degree *2017*

- University of Bologna: 110/110 cum laude (average grade 30/30); University of Glasgow: First Class Honours.
- Thesis: *Facial Ageing* (Supervisors: Prof. Adrian Bowman and Prof. Angela Montanari).
- Awarded the Shell Prize for the best final-year student at the University of Glasgow (2017, €1,500).

Selected Publications

[1] **M. Ciaperoni**, M. Di Vece, R. Pellungrini, L. Pappalardo, F. Giannotti, F. Giannini. Comparing Explanations is not Enough, Explain the Change: New Standards are Needed to Explain Behavioral Shifts in Large Language Models. ***NeurIPS 2026***, Position Paper Track. Accepted for publication.

[2] **M. Ciaperoni**, S. Kutluk, B. Muscato, M. Marchiori Manerba, F. Giannotti. Virgil: Navigating Explainability for Transformer-based Language Models. ***ECML PKDD 2026***, Demo Track. Naples, Italy, 7–11 Sep 2026, pp. 382–386. doi:10.1007/978-3-032-37685-5_39

[3] **M. Ciaperoni**, N. Tziavelis, P. Karras. Efficient Optimization of Fixed-Length Paths. ***IJCAI 2026***. Bremen, Germany, 15–21 Aug 2026, pp. 2199–2207. doi:10.24963/ijcai.2026/245

[4] **M. Ciaperoni**, M. Lalli, S. Piaggesi, M. Varisco, F. Carli, R. Guidotti, D. Pedreschi, F. Raimondi, F. Giannotti. Explainable AI for Cancer Drug Response Prediction: Beyond Univariate Feature Attributions. ***KDD 2026***. Jeju Island, Republic of Korea, 9–13 Aug 2026, pp. 10749–10760. doi:10.1145/3770855.3819010

[5] **M. Ciaperoni**, C. Leiber, A. Gionis, H. Mannila. Khatri-Rao Clustering for Data Summarization. ***EDBT 2026***. Tampere, Finland, 24–27 Mar 2026, pp. 399–412. doi:10.48786/edbt.2026.32

[6] **M. Ciaperoni**, A. Gionis, H. Mannila. Sample and Expand: Discovering Low-Rank Submatrices With Quality Guarantees. ***ECML PKDD 2025***. Porto, Portugal, 15–19 Sep 2025, pp. 78–95. doi:10.1007/978-3-032-06096-9_5

[7] **M. Ciaperoni**, A. Katsamanis, A. Gionis, P. Karras. Beam-search SIEVE for Low-Memory Speech Recognition. ***Interspeech 2024***. Kos, Greece, 1–5 Sep 2024, pp. 272–276. doi:10.21437/Interspeech.2024-2457

[8] **M. Ciaperoni**, H. Xiao, A. Gionis. Efficient Exploration of the Rashomon Set of Rule-Set Models. ***KDD 2024***. Barcelona, Spain, 25–29 Aug 2024, pp. 478–489. doi:10.1145/3637528.3671818

[9] **M. Ciaperoni**, A. Gionis, H. Mannila. The Hadamard Decomposition Problem. ***Data Mining and Knowledge Discovery***. 38(4), pp. 2306–2347, 2024. doi:10.1007/s10618-024-01033-y

[10] **M. Ciaperoni**, H. Xiao, A. Gionis. Concise and Interpretable Multi-Label Rule Sets. ***ICDM 2022***. Orlando, USA, 28 Nov–1 Dec 2022, pp. 71–80. doi:10.1109/ICDM54844.2022.00017

[11] **M. Ciaperoni**, A. Gionis, A. Katsamanis, P. Karras. SIEVE: A Space-Efficient Algorithm for Viterbi Decoding. ***SIGMOD 2022***. Philadelphia, USA, 12–17 Jun 2022, pp. 1136–1145 (*related patent application filed*). doi:10.1145/3514221.3526170

[12] **M. Ciaperoni**, Ç. Aslay, A. Gionis, M. Mathioudakis. Workload-Aware Materialization of Junction Trees. ***EDBT 2022***. Edinburgh, UK, 29 Mar–1 Apr 2022, pp. 65–77. doi:10.5441/002/edbt.2022.06

[13] Ç. Aslay, **M. Ciaperoni**, A. Gionis, M. Mathioudakis. Workload-Aware Materialization for Efficient Variable Elimination on Bayesian Networks. ***ICDE 2021***. Chania, Greece, 19–22 Apr 2021, pp. 1152–1163. doi:10.1109/ICDE51399.2021.00104

[14] E. Galimberti, **M. Ciaperoni**, A. Barrat, F. Bonchi, C. Cattuto, F. Gullo. Span-Core Decomposition for Temporal Networks: Algorithms and Applications. ***ACM Transactions on Knowledge Discovery from Data***. 15(1), Article 2, 2020. doi:10.1145/3418226

[15] **M. Ciaperoni**, E. Galimberti, F. Bonchi, C. Cattuto, F. Gullo, A. Barrat. Relevance of Temporal Cores for Epidemic Spread in Temporal Networks. ***Scientific Reports***. 10, Article 12529, 2020. doi:10.1038/s41598-020-69464-3

More publications and preprints on Google Scholar and DBLP; research code (mainly in Python) and reproducibility materials on GitHub.

Selected Service to the Research Community

- **Co-organizer** of the 1st Workshop on Generative AI for Social Good and Vulnerable Populations (GenAI4SG) at ACM CIKM 2026; the ERC PoC project kick-off event (Pisa, 2026); and a reading group on agentic AI (Pisa, 2026).
- **Guest Editor** for the special issue on "Generative AI for Vulnerable and Underserved Populations," *Information Processing & Management* (2026).
- **Session Chair** at ECML PKDD 2026.
- **Reviewer** for conferences including KDD, AAAI, and ECML PKDD, and journals including JMLR, DMKD, and IEEE TKDE; recognized as Outstanding Emergency Reviewer for the Applied Data Science Track at ECML PKDD 2026.
- **Program Committee Member** for workshops including XKDD, SHIELD-AI, and SAI4OID at ECML PKDD 2026.

Selected Presentations and Lectures

- **Presenter** at conferences including KDD (2024, 2026), ECML PKDD (2024, 2025, 2026), ICDM (2022), and SIGMOD (2022), and at the International Artificial Intelligence Summer School (IAISS, 2025).
- **Invited seminar** at CENTAI Institute, Turin (2023).
- **Lectures** on topics including mechanistic interpretability and explainability of large language models at the University of Pisa and Scuola Normale Superiore, and temporal networks and social network analysis at Aalto University.

Selected Supervised Theses

- *Finding Structures in Document Embeddings Using Sequence Segmentation*. M.Sc. in Machine Learning, Data Science and Artificial Intelligence, Aalto University, 2024.
- *Time Series Forecasting Meets Large Language Models*. B.Sc. in Data Science, Aalto University, 2024.
- *Large Language Models in Event Forecasting*. B.Sc. in Computer Science, Aalto University, 2024.

Languages

Italian (native) · English (fluent) · Finnish (basic)