

Andrea Cini

Ph.D. Student

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Research interests

My research focuses on processing spatiotemporal data by exploiting **relational inductive biases** and **graph representations**. Applications are in **time series analysis** and **reinforcement learning**. I am also broadly interested in the use of machine learning methods to accelerate scientific discovery and engineering.

Education

- 2019– **Ph.D. Student in Informatics**, *IDSIA, Università della Svizzera italiana (USI)*, Lugano, Switzerland, Advisor: Prof. Cesare Alippi.
 - Time Series
 - Graph Deep Learning
- 2016–2018 **MSc Degree in Computer Science and Engineering**, *Politecnico di Milano*, Milan, Italy, Final grade 110/110 with honors, GPA 29.3/30.
- 2013–2016 **BSc Degree in Computer Science and Engineering**, *Politecnico di Milano*, Milan, Italy, Final grade 110/110, GPA 28.3/30.

Work Experience

- 2023 **Visiting Researcher**, *Imperial College London*, London, United Kingdom, Host: Prof. Danilo Mandic.
 - Graph-based spatiotemporal forecasting
- 2019– **Teaching assistant**, *Università della Svizzera italiana (USI)*, Lugano, Switzerland.
- 2018–2019 **R&D Machine Learning Engineer**, *Argotec*, Turin, Italy.
Working on research-oriented Machine Learning projects.
 - Development of Reinforcement Learning algorithms for nanosatellite attitude control.
 - Computer Vision algorithms in a space mission context.

Academic activities

Teaching

- 2022 **Graph Deep Learning**, *MSc, USI*, Teaching assistant and guest lecturer. Director: Prof. Alippi.
- 2020–2024 **Advanced Topics in Machine Learning**, *MSc, USI*, Teaching assistant and guest lecturer. Director: Prof. Alippi.

- 2020,2021 **Machine Learning**, *BSc, USI*, Teaching assistant. Director: Prof. Alippi.
- 2019 **Software Performance**, *MSc, USI*, Teaching assistant. Director: Prof. Hauswirth.
- [Supervised students](#)
- 2022 **Arshjot Khehra**, *MSc @ USI*, Thesis: Hierarchical Graph Reinforcement Learning, Data Scientist at Swiss Data Science Center.
- 2022 **Simone Eandi**, *MSc @ USI*, Thesis: Spatio-Temporal Graph Neural Networks for aggregate load forecasting, Machine Learning Engineer at Intesa.
- 2022 **Hrittik Roy**, *MSc @ USI*, Thesis: Geometric Aspects of Reinforcement Learning, PhD student at Technical University of Denmark.
- 2020 **Gabriel Carraretto**, *BSc @ USI*, Thesis: Graph Representations to Model Physical Systems, MSc student at USI.
- 2019 **Gloria Sassone**, *BSc @ USI*, Thesis: Exploiting AI for automatic gender stereotypes detection in Disney movies, MSc student at USI.

[Talks](#)

- 2023 **Tutorial**, *Organized tutorial on graph deep learning for time series forecasting at ECML 2023.*
- 2023 **Poster presentation**, *Presentation of [5] at the 37th AAAI Conference on Artificial Intelligence.*
- 2022 **Spotlight presentation**, *Spotlight presentation of [5] at the Temporal Graph Learning workshop within NeurIPS 2022.*
- 2022 **Poster presentation**, *Presentation of [10] at the Neural Information Processing Systems (NeurIPS) conference.*
- 2022 **Invited talk**, *TU Dresden*, Invited to talk about my work at the Conference on Reinforcement Learning at TU Dresden.
- 2022 **Poster presentation**, *Presentation of [9] at the International Joint Conference on Neural Networks (IJCNN).*
- 2022 **Invited talk**, *Baker Hughes*, Invited to give a seminar about my work on time series imputation (together with Ivan Marisca).
- 2022 **Poster presentation**, *Presentation of [7] at The Multi-disciplinary Conference on Reinforcement Learning and Decision Making (RLDM).*
- 2022 **Poster presentation**, *Presentation of [8] at the International Conference on Learning Representations (ICLR).*
- 2020 **Oral presentation**, *Presentation of [11] at the International Joint Conference on Neural Networks (IJCNN).*
- 2019 **Poster presentation**, *Presentation of [13] at the International Joint Conference on Neural Networks (IJCNN).*
- 2019 **Oral presentation**, *Presentation of [12] at the Interplanetary CubeSat Workshop .*

[Reviewer](#)

Journals, *JMLR, TNNLS, EVOS.*

Conferences, *NeurIPS, ICLR, AAAI, LOG, IJCNN, ESANN.*

Awards and scholarships

- 2023 **Doctoral mobility grant**, *USI Lugano*, Grant for 6 months of doctoral mobility (18.5K CHF).
- 2022 **Best paper award**, *TGL @ NeurIPS 2022*, Best paper award at the Temporal Graph Learning workshop at NeurIPS 2022.
- 2022 **Travel award**, Travel award to attend the RLDM 2022 conference in Providence (US).
- 2013–2018 **Scholarship**, *Politecnico di Milano*, Reduced tuition for high merits.
- 2013 **Scholarship**, *Liceo Scientifico Giovanni da Castiglione*, Scholarship awarded to the best high-school graduate.

Open-source projects

- 2022 **Torch Spatiotemporal**, <https://github.com/TorchSpatiotemporal/ts1>, A PyTorch library built to accelerate research on neural spatiotemporal data processing methods, with a focus on Graph Neural Networks, Lead developer.

Languages

- Italian Mother tongue
- English Full professional working proficiency

Publications

Preprints

- [1] L. Butera, **A. Cini**, A. Ferrante, and C. Alippi. “Relational Inductive Biases for Object-Centric Image Generation”. In: *arXiv preprint arXiv:2303.14681* (2023).
- [2] **A. Cini**, D. Mandic, and C. Alippi. “Graph-based Time Series Clustering for End-to-End Hierarchical Forecasting”. In: *arXiv preprint arXiv:2305.19183* (2023).
- [3] T. Marzi, A. Khehra, **A. Cini**, and C. Alippi. “Feudal Graph Reinforcement Learning”. In: *arXiv preprint arXiv:2304.05099* (2023).
- [4] D. Zambon, **A. Cini**, L. Livi, and C. Alippi. “Graph state-space models”. In: *arXiv preprint arXiv:2301.01741* (2023).

Conferences

- [5] **A. Cini**, I. Marisca, F. M. Bianchi, and C. Alippi. “Scalable Spatiotemporal Graph Neural Networks”. In: *Proceedings of the AAAI Conference on Artificial Intelligence* (2023).
- [6] **A. Cini**, I. Marisca, D. Zambon, and C. Alippi. “Taming Local Effects in Graph-based Spatiotemporal Forecasting”. In: *Advances in Neural Information Processing Systems (NeurIPS)* (2023).
- [7] **A. Cini**, C. D’Eramo, J. Peters, and C. Alippi. “Deep reinforcement learning with weighted Q-Learning”. In: *The Multi-disciplinary Conference on Reinforcement Learning and Decision Making (RLDM)* (2022).

- [8] **A. Cini**, I. Marisca, and C. Alippi. "Filling the Gaps: Multivariate Time Series Imputation by Graph Neural Networks". In: *International Conference on Learning Representations*. 2022. URL: <https://openreview.net/forum?id=k0u3-S3wJ7>.
- [9] S. Eandi, **A. Cini**, S. Lukovic, and C. Alippi. "Spatio-Temporal Graph Neural Networks for Aggregate Load Forecasting". In: *2022 International Joint Conference on Neural Networks (IJCNN)*. IEEE. 2022, pp. 1–8.
- [10] I. Marisca, **A. Cini**, and C. Alippi. "Learning to Reconstruct Missing Data from Spatiotemporal Graphs with Sparse Observations". In: *Advances in Neural Information Processing Systems (NeurIPS) (2022)*.
- [11] **A. Cini**, S. Lukovic, and C. Alippi. "Cluster-based aggregate load forecasting with deep neural networks". In: *2020 International Joint Conference on Neural Networks (IJCNN)*. IEEE. 2020, pp. 1–8.
- [12] **A. Cini**, M. E. Hariry, and A. Balossino. "Neural Attitude Control: Nanosatellite attitude control with Deep Reinforcement Learning". In: *Interplanetary CubeSat Workshop (iCubeSat)*. 2019.
- [13] C. D'Eramo, **A. Cini**, and M. Restelli. "Exploiting Action-Value Uncertainty to drive Exploration in Reinforcement Learning". In: *International Joint Conference on Neural Networks (IJCNN)*. 2019.

Journals

- [14] **A. Cini**, D. Zambon, and C. Alippi. "Sparse Graph Learning from Spatiotemporal Time Series". In: *Journal of Machine Learning Research* 24.242 (2023), pp. 1–36.
- [15] N. A. Efkarpidis, S. Imoscopi, M. Geidl, **A. Cini**, S. Lukovic, C. Alippi, and I. Herbst. "Peak shaving in distribution networks using stationary energy storage systems: A Swiss case study". In: *Sustainable Energy, Grids and Networks* 34 (2023), p. 101018.
- [16] L. Ferretti, **A. Cini**, G. Zacharopoulos, C. Alippi, and L. Pozzi. "Graph Neural Networks for High-Level Synthesis Design Space Exploration". In: *ACM Transactions on Design Automation of Electronic Systems* (2022).
- [17] C. D'Eramo, **A. Cini**, A. Nuara, M. Pirota, C. Alippi, J. Peters, and M. Restelli. "Gaussian Approximation for Bias Reduction in Q-Learning". In: *Journal of Machine Learning Research* 22 (2021), pp. 1–51.