Giovanni Luca Marchetti

Postdoctoral Researcher in Theoretical Machine Learning | Email: glma@kth.se | Webpage: people.kth.se/∼glma/
Department of Mathematics, Royal Institute of Technology (KTH), Stockholm, Sweden.

EDUCATION

- Ph.D. Computer Science — 05/2020 – 04/2024
  Royal Institute of Technology (KTH), Stockholm, Sweden
  · Worked on geometric deep learning and high-dimensional statistics, with applications to robotics.
  · *Thesis title*: On Symmetries and Metrics in Geometric Inference.
  · *Supervisor*: Danica Kragic.
- Ph.D. (uncompleted) Pure Mathematics — 10/2017 – 03/2020
  University of Sheffield, United Kingdom
  · Worked on algebraic geometry and category theory, with applications to string theory.
  · *Supervisor*: Tom Bridgeland.
- M.Sc. Pure Mathematics — 10/2015 – 07/2017
  University of Rome La Sapienza, Italy
  · *Grade*: Summa cum laude, with an excellence award.
- B.Sc. Pure Mathematics — 10/2012 – 07/2015
  University of Rome La Sapienza, Italy
  · *Grade*: Summa cum laude, with an excellence award.

WORK EXPERIENCE

- Postdoctoral Researcher — 05/2024 – Now
  Royal Institute of Technology (KTH), Stockholm, Sweden
  · Working on theoretical approaches to deep learning via algebraic geometry.
  · *Supervisor*: Prof. Kathlén Kohn.
- Research Intern — 06/2023 – 10/2023
  Qualcomm AI Research, Amsterdam, The Netherlands
  · Worked on geometric deep learning for combinatorial optimization, with applications to signal processing.

SELECTED PUBLICATIONS

· Nathan W Henry†, Giovanni Luca Marchetti†, and Kathlén Kohn†. *Geometry of Lightning Self-Attention: Identifiability and Dimension*. In: International Conference on Learning Representations (ICLR). 2025.

· Vahid Shahverdi†, Giovanni Luca Marchetti†, and Kathlén Kohn†. *On the Geometry and Optimization of Polynomial Convolutional Networks*. In: International Conference on Artificial Intelligence and Statistics (AISTATS). 2025.

· Giovanni Luca Marchetti, Gabriele Cesa, Kumar Pratik, and Arash Behboodi. *Neural Lattice Reduction: A Self-Supervised Geometric Deep Learning Approach*. In: Transactions on Machine Learning Research (TMLR), 2025.

· Alejandro García-Castellanos, Aniss Aiman Medbouhi, Giovanni Luca Marchetti, Erik J Bekkers, and Danica Kragic. *Hypersteiner: Computing Heuristic Hyperbolic Steiner Minimal Trees*. In: Symposium on Algorithm Engineering and Experiments (ALENEX), 2025.

· Giovanni Luca Marchetti, Christopher J Hillar, Danica Kragic, and Sophia Sanborn. *Harmonics of Learning: Universal Fourier Features Emerge in Invariant Networks*. In: Conference on Learning Theory (COLT). 2024.

· Aniss Aiman Medbouhi, Giovanni Luca Marchetti, Vladislav Polianskii, Alexander Kravberg, Petra Poklukar, Anastasia Varava, and Danica Kragic. *Hyperbolic Delaunay Geometric Alignment*. In: European Conference on Machine Learning (ECML-PKDD). 2024.

· Giovanni Luca Marchetti, Vladislav Polianskii, Anastasiia Varava, Florian T Pokorny, and Danica Kragic. *An Efficient and Continuous Voronoi Density Estimator*. In: International Conference on Artificial Intelligence and Statistics (AISTATS). 2023. **Notable Paper award**.

· Giovanni Luca Marchetti†, Gustaf Tegnér†, Anastasiia Varava, and Danica Kragic. *Equivariant Representation Learning via Class-Pose Decomposition*. In: International Conference on Artificial Intelligence and Statistics (AISTATS). 2023.

· Alfredo Reichlin†, Giovanni Luca Marchetti†, Hang Yin, Anastasiia Varava, and Danica Kragic. *Learning Geometric Representations of Objects via Interaction*. In: European Conference on Machine Learning (ECML-PKDD). 2023.

- Luis Perez Rey[†], Giovanni Luca Marchetti[†], Danica Kragic, Dimitri Jarnikov, and Mike Holenderski. *Equivariant Representation Learning in the Presence of Stabilizers*. In: European Conference on Machine Learning (ECML-PKDD). 2023.
- Alexander Kravberg[†], Giovanni Luca Marchetti[†], Vladislav Polianskii[†], Anastasiia Varava, Florian T Pokorny, and Danica Kragic. *Active Nearest Neighbor Regression Through Delaunay Refinement*. In: International Conference on Machine Learning (ICML). 2022.
- Vladislav Polianskii[†], Giovanni Luca Marchetti[†], Alexander Kravberg, Anastasiia Varava, Florian T Pokorny, and Danica Kragic. *Voronoi Density Estimator for High-Dimensional Data: Computation, Compactification and Convergence*. In: Uncertainty in Artificial Intelligence (UAI). 2022.
- Alfredo Reichlin, Giovanni Luca Marchetti, Hang Yin, Ali Ghadirzadeh, and Danica Kragic. *Back to the Manifold: Recovering from Out-of-Distribution States*. In: International Conference on Intelligent Robots and Systems (IROS). 2022.
- Domenico Fiorenza[†], Fosco Loregian[†], and Giovanni Luca Marchetti[†]. *Hearts and Towers in Stable Infinity-Categories*. In: Journal of Homotopy and Related Structures. 2019.

Note: The symbol [†] denotes shared first-authorship.
A complete list of publications is available on Google Scholar [LINK].

TEACHING EXPERIENCE

Contributed to the following courses:

- Groups and Rings (guest lectures) 2025
- Artificial Intelligence (tutorials, examination, organization) 2022, 2023
- Computer Vision (tutorials and examination) 2023
- Database Technology (tutorials and examination) 2021, 2022
- Scientific Programming in Python (tutorials) 2019
- Mechanics and Fluids (tutorials and examination) 2019
- Analysis and Algebra (tutorials) 2018, 2019

SUPERVISORY AND ORGANIZATIONAL ACTIVITY

Co-supervised the following students:

- Aniss Medbouhi (Ph.D.) 2023 – Now
- Alejandro García Castellanos (Ms.Sc. and research engineer) 2023 – 2024
- Markus Hector (Ms.Sc.) 2022 – 2023

Co-organized the following events and activities:

- Workshop: *Geometric Deep Learning in Umeå (GeUmetric)* 2025
- Reading Seminar: *Computer Vision and Deep Learning* 2022 – 2023
- Reading Seminar: *Geometry and Machine Learning* 2021 – 2023

SELECTED SOFTWARE

Developed the following machine learning software:

- [LINK] A deep self-supervised framework for learning group-equivariant representations (in PyTorch).
- [LINK] A constrastive complex-valued network based on harmonic analysis (in PyTorch, JAX).
- [LINK] A high-dimensional non-parametric density estimator based on Voronoi cells (in `C++`, NumPy).

Further software is available on GitHub [LINK].

SKILLS

- *Languages*: Italian (native), Russian (native), English (professional), Swedish (basic), French (basic).
- *Programming*: `Python` (NumPy, PyTorch, JAX), `C`, `C++`, LaTeX, `Bash`, SQL.