

Alejandro García Castellanos

Ph.D. Candidate Machine Learning
AMLab, University of Amsterdam

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RESEARCH INTERESTS

Applying topology, geometry, and algebra to the representation learning and generative modeling of shapes for enhanced human-AI collaboration.

EXPERIENCE

Ph.D. Candidate

Feb. 2024 – Present

AMLab (Amsterdam Machine Learning Lab), UvA

Amsterdam, Netherlands

- Under the supervision of Erik Bekkers (UvA) and co-supervision of Daniël Pelt (ULEI)
- Sponsored by [The Hybrid Intelligence Centre](#)
- Geometry-informed machine learning techniques for collaborative human-computer image annotation

Research Engineer

Mar. 2023 – Feb. 2024

RPL (Division of Robotics, Perception and Learning), KTH

Stockholm, Sweden

- Under the supervision of Danica Kragic
- Metric learning in generative models
- Hierarchy discovery in Hyperbolic geometry

Trainee Internship

Sep. 2020 – Jan. 2021

MEDAL laboratory, CTB (Center of Biomedical Technology)

Madrid, Spain

- Under the supervision of Ernestina Menasalvas
- Development of new techniques for information recognition in medical corpus
- Fine-tuning an LLM in breast and lung cancer's clinical notes

EDUCATION

MSc in Machine Learning

Sep. 2021 – Oct. 2023

KTH Royal Institute of Technology

Stockholm, Sweden

- Average grade: 4.00 GPA
- Applied Mathematics elective track: Topological Data Analysis, Regression Analysis, Time Series Analysis
- Thesis in “*Topological regularization and relative latent representations*”

B.S. in Mathematics and Computer Science

Sep. 2017 – Jul. 2021

Universidad Politécnica de Madrid

Madrid, Spain

- Average grade: 9.78/10.0 (4.00 GPA)
- Best academic record amongst all programs at the ETSIINF (Higher Technical School of Computer Engineers) of the promotion 2020/2021
- Honours granted by UPM in 29 courses
- Three Scholarships for Academic Excellence granted by the Community of Madrid
- Thesis in “*Robustness of Persistent Homology: the Stability Theorem*”

SKILLS

Programming: Python, Java, C, R, SQL, MATLAB, Maple, Prolog, Bash

ML Frameworks: PyTorch, PyTorch Lightning, JAX, TensorFlow

Tools: \LaTeX , Git, Microsoft Office, Keynote, Pages, Adobe Photoshop, Adobe Lightroom

Soft Skills: public speaking, written communication, teamwork, project and time management, critical thinking, analytical skills, research skills, creativity, strategic thinking

TEACHING & SUPERVISION

Reinforcement Learning

2025, 2026

Teaching assistant

Master In Artificial Intelligence, UvA

Deep Learning 2

2024, 2025

Teaching assistant and project supervisor

Master In Artificial Intelligence, UvA

Master Thesis Supervisor

2025

Thesis: “Persistent Homology Go Combinatorial”

Master In Artificial Intelligence, UvA

RESEARCH PUBLICATIONS

- NeurIPS '25 **A. García-Castellanos**, D. R. Wessels, N. J. Berg, R. Duits, D. M. Pelt, E. J. Bekkers (2025). “*Equivariant Eikonal Neural Networks: Grid-Free, Scalable Travel-Time Prediction on Homogeneous Spaces*”. In: *Advances in Neural Information Processing Systems (NeurIPS)*.
- ALENEX '25 **A. García-Castellanos***, A. A. Medbouhi*, G. L. Marchetti, E. J. Bekkers, D. Kragic (2025). “*Hypersteiner: Computing heuristic hyperbolic steiner minimal trees*”. In: *2025 Proceedings of the Symposium on Algorithm Engineering and Experiments (ALENEX)*.
- TAG-DS '25 O. Boufalis*, J. Carrasco-Pollo*, J. Rosenthal*, E. Terres-Caballero*, **A. García-Castellanos** (2025). “*Symmetry-Aware Graph Metanetwork Autoencoders: Model Merging through Parameter Canonicalization*”. In: *Proceedings of the 1st Conference on Topology, Algebra, and Geometry in Data Science (TAG-DS)*. **Oral presentation**.
- Oral
- UniReps '24 **A. García-Castellanos**, G. L. Marchetti, D. Kragic, M. Scolamiero (2024). “*Relative representations: Topological and geometric perspectives*”. In: *Proceedings of the II edition of the Workshop on Unifying Representations in Neural Models (UniReps)*.

PREPRINTS & MANUSCRIPTS

- UniReps '25 B. Kuipers*, F. Byrman*, D. Uytterlinde* **A. García-Castellanos** (2025). “*Symmetry-Aware Fully-Amortized Optimization with Scale Equivariant Graph Metanetworks*”. In: *Extended Abstract track of the III edition of the Workshop on Unifying Representations in Neural Models (UniReps)*.
- (Ext. Abs.)
- ArXiv '25 **A. García-Castellanos***, A. A. Medbouhi*, G. L. Marchetti, D. M. Pelt, E. J. Bekkers, D. Kragic (2025). “*Randomized HyperSteiner: A Stochastic Delaunay Triangulation Heuristic for the Hyperbolic Steiner Minimal Tree*”.
- (Preprint)
- GRaM '24 D. Canez*, N. Midavaine*, T. Stessen*, J. Fan*, S. Arias*, **A. García-Castellanos** (2024). “*Effect of equivariance on training dynamics*”. In: *Blog post track of the I edition of the Workshop on Geometry-grounded Representation Learning and Generative Modeling (GRaM)*.
- (Blog post)
- GRaM '24 M. Carrasco*, A. Berentzen*, **A. García-Castellanos** (2024). “*Applications of TopoX to Equivariant Topological Networks*”. In: *Blog post track of the I edition of the Workshop on Geometry-grounded Representation Learning and Generative Modeling (GRaM)*.
- (Blog post)

INVITED TALKS

4th workshop on Mathematics and AI

June 2025

Tilburg, Netherlands

Learning on Graphs Conference

November 2024

Amsterdam, Netherlands

COMMUNITY SERVICE

Reviewer <i>NeurIPS Proceedings</i>	2025
Reviewer <i>NeurReps Workshop</i>	2025
Reviewer <i>UniReps Workshop</i>	2024
Reviewer <i>ICML Proceedings</i>	2024

LANGUAGES

- English:** Advanced level (C1), CAE by Cambridge English
- Spanish:** Native language
- German:** Low Beginner Level