

Alejandro García Castellanos

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

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Google Scholar: [Alejandro García-Castellanos](https://scholar.google.com/citations?user=HgXzQAAJAAQ&hl=en)

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

AMLab (Amsterdam Machine Learning Lab), UvA

Feb. 2024 – Present

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

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

Mar. 2023 – Feb. 2024

Stockholm, Sweden

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

Trainee Internship

MEDAL laboratory, CTB (Center of Biomedical Technology)

Sep. 2020 – Jan. 2021

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

KTH Royal Institute of Technology

Sep. 2021 – Oct. 2023

Stockholm, Sweden

- Average grade: 4.00 GPA
- Thesis in “*Topological regularization and relative latent representations*”

B.S. in Mathematics and Computer Science

Universidad Politécnica de Madrid

Sep. 2017 – Jul. 2021

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: L^AT_EX, 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

Teaching assistant

2025, 2026

Master In Artificial Intelligence, UvA

Deep Learning 2

Teaching assistant and project supervisor

2024, 2025

Master In Artificial Intelligence, UvA

Master Thesis Supervisor

Thesis: "Persistent Homology Go Combinatorial"

2025

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. Krasic (2025). "*Hypersteiner: Computing heuristic hyperbolic steiner minimal trees*". In: *2025 Proceedings of the Symposium on Algorithm Engineering and Experiments (ALENEX)*.

TAG-DS '25

Oral

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*.

UniReps '24

A. García-Castellanos, G. L. Marchetti, D. Krasic, 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
(Ext. Abs.)

B. Kuipers*, F. Byrman*, D. Uyterlinde* **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)*.

ArXiv '25
(Preprint)

A. García-Castellanos*, A. A. Medbouhi*, G. L. Marchetti, D. M. Pelt, E. J. Bekkers, D. Krasic (2025). "*Randomized HyperSteiner: A Stochastic Delaunay Triangulation Heuristic for the Hyperbolic Steiner Minimal Tree*".

GRaM '24
(Blog Post)

D. Canez*, N. Midavaine*, T. Stessen*, J. Fan*, S. Arias*, **A. García-Castellanos** (2024). "*Effect of equivariance on training dynamics*". In: *Workshop Blog track at the I edition of the Workshop on Geometry-grounded Representation Learning and Generative Modeling (GRaM)*.

GRaM '24
(Blog Post)

M. Carrasco*, A. Berentzen*, **A. García-Castellanos** (2024). "*Applications of TopoX to Equivariant Topological Networks*". In: *Workshop Blog track at the I edition of the Workshop on Geometry-grounded Representation Learning and Generative Modeling (GRaM)*.

INVITED TALKS

4th workshop on Mathematics and AI
Tilburg, Netherlands

June 2025

Learning on Graphs Conference
Amsterdam, Netherlands

November 2024

COMMUNITY SERVICE

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

LANGUAGES

English: Advanced level (C1), CAE by Cambridge English

Spanish: Native language

German: Low Beginner Level