

Paulina Hoyos

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Professional Summary

Applied mathematician working on randomized tensor algorithms as well as geometric and graph methods in data science. Solid experience in interdisciplinary research. Ample exposure presenting scientific works and explaining concepts to both fellow researchers and non-technical audiences.

Education

Ph.D. in Mathematics, The University of Texas at Austin, TX Expected May 2026
Research: symmetries in data, manifold learning, tensor systems and sketching

M.Sc. in Mathematics, Universidad Nacional de Colombia, Medellín April 2021

B.Sc. in Physics, Universidad de los Andes, Bogotá, Colombia April 2016

Programming Experience

Python (SciKit-Learn, Pandas, PyTorch, SQL), Matlab (tensor toolbox, tensor-tensor-product toolbox), Mathematica (symbolic programming), R.

- **IPAM, UCLA - Iterative Methods for Factorized Tensors:** Developed and implemented randomized algorithms for solving large systems of multi-linear equations for factorized tensors and noisy, corrupted data.
- **UT Austin - Customer Behavior Clustering:** Analyzed credit card usage data to identify clusters of customer behavioral archetypes and used it for risk profiling and product recommendations. [\[Github\]](#)
- **UT Austin - 2nd CSEDM Data Challenge:** Applied Random Forests, Ada Boost, and k -Neighbors to predict students' final exam grades in a programming course based on their performance in the first 30 assignments. [\[Github\]](#)

Research Experience

- **UT Austin - Manifold Learning with Symmetries:** Applied techniques in differential geometry to model symmetries in non-linear data and used spectral graph theory and representations of Lie groups to obtain a fast dimensionality reduction algorithm.
 - P. Hoyos and J. Kileel. *Diffusion Maps for Group-Invariant Manifolds*. [arXiv: 2303.16169](#).
- **Universidad Nacional de Colombia & UT Austin - Heat Kernel on Graphs:** Derived explicit solutions to the heat equation on different types of graphs and utilized them to obtain non-trivial trigonometric identities and characterize diffusion processes.
 - C. Cadavid, P. Hoyos, J. Jorgenson, L. Smajlović, and J. Vélez. *Discrete diffusion-type equation on regular graphs and its applications*. *Journal of Difference Equations and Applications*, 29:4, 455-488, 2023. [\[Journal\]](#)
 - C. Cadavid, P. Hoyos, J. Jorgenson, L. Smajlović, and J. Vélez. *On an approach for evaluating certain trigonometric character sums using the discrete time heat kernel*. *European Journal of Combinatorics*, Volume 108, 2023. [\[Journal\]](#)
 - C. Cadavid, P. Hoyos, J. Jorgenson, L. Smajlović, and J. Vélez. *An integer factorization algorithm which uses diffusion as a computational engine*. [arXiv:2104.11616](#)