JOSE NICOLAS MARIN GAMBOA
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EDUCATION

University of Chicago, Chicago, Illinois
MS/BS Mathematics and BS Computer Science, expected in June 2025 **Cumulative GPA:** 3.89/4.00
Relevant Coursework: Deep Learning Systems; Machine Learning on Groups, Graphs, and Manifolds; Deep Learning; Complexity Theory; Measure Theory; Algebraic Topology; Combinatorics; Representation Theory of Lie Groups; Algebraic Geometry; Algebraic Number Theory; Statistical Theory and Methods; Operating Systems, Computer Networks; Partial Differential Equations; Type Theory; Honors Algorithms; Honors Mathematical Probability [Graduate courses underlined]
Teaching: Teaching Assistant for Complexity Theory, Honors Discrete Mathematics, and Accelerated Real Analysis I/II
Honors: Deans' List 2021, 2023

RESEARCH AND PROJECTS

Advised by Prof. McAllester, Chicago, IL, December 2023-Present
- Developed a novel second-order optimization algorithm for training deep neural networks that outperforms the state of the art (Adam) by 30-60% in wall-clock time. Currently under review for ICLR 2025 (First Author).

Advised by Prof. Kondor, Chicago, IL, January 2024-Present
- Utilized Pytorch Geometric, Pytorch Lightning, and Gudhi packages to produce Python-native implementations of Graph Neural Network (GNN) layers that leverage tools from Topological Data Analysis
- Used LeanDojo and Pytorch Geometric to build automated theorem proving (ATP) leveraging recent advances from our lab in higher-order (GNNs).

Advised by Prof. May Chicago, IL, June 2023-December 2023
- Contributed novel categorical structures applied to Homotopy Theory. Working towards publication later this year
- Presented to the National Security Administration (NSA) on applications of category theory in formal verification, databases, and systems engineering for optimal control

EXPERIENCE

Summer Coding at UChicago: Builder's Academy
Instructor, Chicago, IL, June 2024 - Present
- Developed, tested, and taught Python programming activities for Chicago Public Schools underrepresented students
- Designed and implemented a networked multiplayer game project using Pygame and Twisted for advanced students
- Organized network programming workshop to teach students about socket programming and computer networks

Harvard College Economics Labs
Chicago Team Project Member, Chicago, IL, Jan 2023-Dec 2023
- Partnered with Brookings Institute to analyze effect of warehouse work on economic mobility and local employment
- Partnered with the Census Bureau to train LLM to predict metrics measuring the evolution of the cannabis economy

The University of Chicago Math Research Experience for Undergraduates
Program Participant, Chicago, IL, June 2022 - August 2022
- Researched, wrote, and presented an expository paper in combinatorial/computational topology
- Took an intensive eight-week course in combinatorics, graph theory, number theory, and geometry

Instituto Centroamericano de Administración de Empresas (INCAE)
Research Intern under Dr. Luis Lopez, Alajuela, Costa Rica, July 2019 - August 2019, June 2020-August 2020
- Co-authored and pioneered multimedia case studies in active use for MBA operations coursework
- Publication in the Sept 2023 edition of INCAE Business Review featuring remarkable previous case studies

SKILLS

- Python, C/C++, OCaml, Haskell, Numpy, Pandas, PyTorch, JAX, TCP/IP, CUDA, Mathematical Statistics, Convex Optimization, Non-Convex Optimization, Algorithms, System Design, Category Theory, RegEx

ADDITIONAL INFORMATION

- Gold Medal (2020, 2018) and Silver Medal (2019) at the Costa Rican National Mathematics Olympiad.
- Bronze Medal (3rd place) at the 2020 Costa Rican National Physics Olympiad.