Luca Nijim

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EDUCATION

University of Notre Dame | Notre Dame, IN — Expected Graduation: May 2026
Bachelor of Science — *GPA: 3.92*
Major: Mathematics (Honors) | Concentration: Computing
Courses: Graduate Real Analysis; SQL for Data Science; Google Machine Learning Crash Course; PDEs; Abstract Algebra

WORK EXPERIENCE

Applied Mathematics REU | University of Maryland, College Park — June 2023 – August 2023
Undergraduate Researcher - paid

- Simulated dynamics of stochastic Duffing oscillator, discretizing the system using Markov chain. Wrote over 2,000 lines of Python. Provided insights into the dynamics of transition paths, with application to vibrations and controls.
- Trained neural network to approximate committor function for stochastic differential equations, with applications to biomolecular dynamics and state transitions.
- Created Python script to analyze the greatest connected component of various random graphs. Simulations supported theoretical results of random graph generating functions with applications to SIR models/epidemiology.

Research in Geometric Machine Learning | University of Notre Dame — January 2023 – May 2023
Research Assistant - for credit

- Implemented contemporary algorithms to find tangent spaces to manifolds underlying high-dimensional data.
- Created a new algorithm based on diffusion maps that more accurately approximated tangent space with manifold dimension 1 or 2 in ambient dimension 2 and 3, showing a log angle error of -4 compared to the original algorithm's -2 for a million sample points.

LEADERSHIP AND ACTIVITIES

CS For Good | University of Notre Dame — August 2022 – Present
Project Coordinator; Project Lead

- Networked with local nonprofit coordinators to find projects for the club
- Am leading a project with Riverbed Community Math Center to develop and deploy web apps (Bootstrap, JQuery) to assist in math education: multiplication games, interactive fractal explorers, and a machine learning algorithm to play Nim games.

Math Circles | University of Notre Dame — August 2022 – Present
Volunteer

- Designed programming for and instructed weekly math workshops for over 15 local 1st-3rd graders. Taught fun and abstract math concepts through activities, like the four-color theorem and the n queens problem.
- Coordinated math demonstration at two local science events, reaching over 1,000 2nd-8th graders in the area with fun activities like modular origami and an x-y plotter, and a talk about "Brussels sprouts" and Euler characteristics.

Math Club | University of Notre Dame — August 2023 – Present
Treasurer

- Organized biweekly events including guest lectures, a TeX workshop, REU application seminars, and social events.
- Managed budget of $3,000 and organized fundraising through merchandise sales.

Marching Band | University of Notre Dame — August 2022 – Present
Band Ambassador

- Perform at football and hockey games and other school events. 15+ hours/week spent at practice and games.
- Reach out to interested incoming students to foster band community

Programming Challenges — August 2023 – Present

- Completed all 25 2022 Advent of Code challenges, using graph algorithms, simulation, and discrete math techniques.
- Participate in monthly Jane Street puzzles, one of under 300 solvers for several problems.

SKILLS AND INTERESTS

Technical: Python (NumPy, SciPy, NetworkX, PyTorch, TensorFlow, MatPlotLib, Jupyter Notebook, object-oriented design principles); Git; LaTeX (Overleaf, Beamer), SQL (PostgreSQL, PGAdmin, relational databases); C; Front-End (JavaScript, JQuery, Bootstrap); Microsoft Office (Excel, Word, PowerPoint); Unix and command line