ABHINAV MADABHUSHI

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EDUCATION

Georgia Institute of Technology
Ph.D. in Operations Research Aug. 2026 – Present
Advisor: Prof. Katya Scheinberg

University of California, Los Angeles
Bachelor of Science in Data Theory, Minor in Data Science Engineering June 2026
Cumulative GPA: 3.90/4.0

RESEARCH INTERESTS

Continuous Optimization, Machine Learning

PUBLICATIONS AND PREPRINTS

[1] A. Madabhushi, J. Liu, and M. Zhang. Learned Preconditioning for a Primal-Dual Interior-Point Method. arXiv preprint, 2026. [arXiv]

RESEARCH EXPERIENCE

Georgia Institute of Technology July 2026 – September 2026
Graduate Researcher | Advisor: Prof. Katya Scheinberg
Project: Derivative-Free Optimization with Noisy Function Evaluations

- Conducted computational experiments investigating finite-difference gradient estimation in lower-dimensional subspaces under noisy function evaluations.
- Evaluated the effects of evaluation noise, finite-difference approximation, and subspace projection error to assess theoretical predictions of estimation accuracy and oracle complexity for convergence.

University of California, Los Angeles January 2025 – September 2026
Undergraduate Researcher | Advisor: Prof. Minxin Zhang
Project: Learned Preconditioning for Primal-Dual Interior-Point Methods

- Developed a learning-to-optimize framework (pdLIP) that integrates learned diagonal preconditioning into a primal-dual interior-point method for constrained convex and nonconvex optimization.
- Designed a coordinate-wise recurrent neural network to approximate primal search directions without Hessian evaluations or Newton-system solves, recovering slack and multiplier directions analytically.
- Implemented a self-supervised training framework based on a penalty-barrier merit function and perturbed optimality conditions, enabling learning without precomputed solutions.
- Demonstrated 63–67% reductions in refinement iterations across four classes of 200-dimensional optimization problems, with improvements extending to higher-dimensional problems and practical applications.

University of California, Los Angeles March 2025 – June 2025
Undergraduate Capstone Project | Reinforcement Learning for Neural Architecture Search

- Developed a Deep Q-Network (DQN) agent to automate neural architecture search for multilayer perceptrons, sequentially selecting architectural components from a discrete action space.
- Designed complexity-regularized reward functions to balance predictive performance and model complexity.
- Evaluated learned architectures on the Higgs and Forest Cover datasets, demonstrating improvements over manually designed baseline architectures.

Bruin Sports Analytics, UCLA September 2023 – June 2024
Researcher | NBA Fantasy Player Prediction

- Developed machine learning models, including gradient boosting, random forests, and neural networks, to predict NBA player statistics and fantasy points using historical data.
- Engineered features incorporating player performance, college statistics, draft position, and injury history to improve predictions for veterans and rookies.
- Achieved R^2 values up to 0.90 for veteran player statistics, with tree-based models outperforming neural network approaches.

PROFESSIONAL EXPERIENCE

Tokio Marine HCC June 2024 – September 2024
Sports Analytics Research Intern

- Researched modeling methods to predict injury rates for NFL Total Temporary Disability insurance.
- Updated eight Python scripts of existing NLP project to extract injury data from raw text sources.
- Developed scalable processing pipelines for injury data transformation for detailed analysis.
- Developed and pitched new insurance products in the sports industry to executives through R&D.
- Used statistics and simulations to price three contractual bonuses and prize accounts.

Kshema General Insurance Limited July 2023 - September 2023
Data Science Intern

- Applied time series and regression models to predict crop yield using weather data.
- Integrated face and document verification using Convolutional Neural Network (CNN) and Optical Character Recognition (OCR) for an app enrolling 100,000 farmers.
- Developed an OCR algorithm to read term sheets, saving over 100 hours of manual work.
- Simulated crop yield and payout numbers to strategize pricing for 10 state-crop combinations.

TEACHING & MENTORING

Georgia Institute of Technology August 2026 – Present
Graduate Teaching Assistant | ISyE 4032: Regression Analysis

- Provide drop-in tutoring for undergraduate students, assisting with conceptual questions and problem-solving in regression analysis.

Curious Cardinals August 2024 – January 2026
Math and Machine Learning Mentor

- Mentored three students in AMC8 & AMC10 preparation and creation of sports analytics and machine learning passion projects.

Bruin Sports Analytics, UCLA May 2023 – May 2024
Membership Development Chair

- Organized and presented five workshops on data analysis, wrangling, visualization, and machine learning in R and Python to an audience of 150 club members.

LEADERSHIP & SERVICE

Bruin Sports Analytics, UCLA May 2024 – May 2025
President & Research Lead

- Led research, data journalism, and consulting teams across multiple sports, overseeing project development and coordinating research activities.
- Directed research recruitment and project selection, organized weekly meetings, and mentored members in data analysis and machine learning methodologies.
- Managed organizational operations, coordinated with faculty advisors, and organized events and workshops for club members.

Cricket Club, UCLA May 2023 – May 2024
Treasurer

- Managed club finances and organized seven fundraising events, raising approximately $9,000 to support team operations.

HONORS & AWARDS

Thomas H. Johnson Fellowship, Georgia Institute of Technology | 2026–2027
Dean's Honors List, University of California, Los Angeles | 8 of 11 quarters

TECHNICAL SKILLS

Programming Languages: Python, R, C++, SQL
Libraries & Frameworks: PyTorch, NumPy, SciPy, Pandas, scikit-learn, Matplotlib
Tools: Git, LaTeX