Karen Medlin

Ph.D. Candidate in Applied Mathematics

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Education

University of North Carolina at Chapel Hill, Chapel Hill, NC
Ph.D. Applied Mathematics (M.S. in Mathematics, 2022) 2019 - 2025 (expected)
Co-advisors: Greg Forest, Krishnan Raghavan[1]

- Dissertation research: As a U.S. Department of Energy Office of Science Graduate Student Research (SCGSR) Awardee, developing algorithms to improve the classification of imbalanced data, a prevalent challenge in machine learning. In collaboration with physicists at Argonne National Laboratory, the novel algorithms will be applied to predict rare subatomic events captured by particle detectors at CERN.
- Courses: algorithms, data structures, machine learning, numerical linear algebra, optimization, probability, scientific computing, and statistical modeling

IBM Research Summer School on Sketching and Tensor Algebra, San Jose, CA
Collaboration between IBM and Mathematical Sciences Research Institute (MSRI) July 2023

University of Washington, Seattle, WA
Masters degree coursework in Mathematics 2018 - 2019

City University of New York, New York, NY
Post-baccalaureate coursework in Mathematics 2014 - 2018

Skills

Programming Languages: Java, Python, R, Shell scripting

Python Libraries: Matplotlib, Numpy, Pandas, PyTorch

Communications: Grant writing

Awards & Certificates

U.S. Department of Energy Office of Science SCGSR Award 2023 - 2024

UNC ARPA Graduate Degree Completion Grant 2021 - 2022

Introduction to High Performance Computing (HPC) Certificate Nov. 2022
Super Computing Conference (SC22)

Certificate in Data Science Summer 2018
Principal Analytics Prep *Harvard Business School Startup Studio*

Work Experience

Graduate Research Assistant 2019 - present
UNC Chapel Hill Mathematics Department

- Currently developing algorithms to improve the classification of imbalanced data.
- Working in Python and Git and running code on a Linux-based supercomputer.

National Science Foundation Math Sciences Graduate Intern Summers 2022 & 2023
Argonne National Laboratory

- Began what became my dissertation research on the classification of imbalanced data during a summer internship in Argonne's Mathematics and Computer Science Division.
- Developed code in Python with PyTorch library.

Senior Grants Manager 2012 - 2017
The Joyce Theater Foundation, Inc., New York, NY

- Exceeded fundraising targets year over year for an operational budget of $10+ million. Increased annual contributed income by $1 million (50%) over five years.
- Daily workflow and donor pipeline in a SQL-based database.

Teaching Experience

Recitation Leader

- Math 233: Calculus III, UNC Chapel Hill — Fall 2023
- Math 232: Calculus II, UNC Chapel Hill — Spring 2023
- Math 231L: Lab class for Math 231 - Calculus I, UNC Chapel Hill — Fall 2021
- Math 125: Calculus II, Univ. Washington — Fall 2018, Winter 2019, Spring 2019

Assistant

- Math 347: Linear Algebra for Applications, UNC Chapel Hill — Fall 2020-2022

Involvement

Graduate Mathematics Association 2019 - present
UNC Chapel Hill Mathematics Department

- Treasurer, 2021-2022

Society for Industrial and Applied Mathematics 2019 - present

- National Math Festival Volunteer, 2021

Anti-Racism Community Group (ARC) 2020 - 2022
UNC Chapel Hill Mathematics Department

- Founder and Organizer

Super Computing Conference 2022 (SC22) Nov. 2022

- Student Volunteer

Presentations & Publications

Paper Dec. 2023 (expected)
"PLEUM: Performance-driven Learning and Exploratory Undersampling"

Triangle Computational and Applied Mathematics Symposium(TriCAM) Sept. 2022
North Carolina State University
Lightning Talk and Poster: To Classify Imbalanced Data Correctly, Find the Best ~~Model~~ Data

Paper Dec. 2021
"Maximum Covering Subtrees for Phylogenetic Networks," *IEEE/ACM Transactions on Computational Biology and Bioinformatics,* 18(6): 2823-2827, DOI:10.1109/TCBB.2020.3040910.

Underrepresented Students in Topology and Algebra Symposium Apr. 2018
Reed College
Poster presentation: Neural Networks and the Shape of Data

Joint Mathematics Meeting Jan. 2017
Atlanta
Poster: The Perceptron: An Introduction to Machine Learning