

William Swartworth

wswartworth@gmail.com

EDUCATION

University of California Los Angeles

Los Angeles, CA

Ph.D. Applied Mathematics

June 2023

Advisor: Deanna Needell

M.S. Applied Mathematics

January 2020

University of Texas at Austin

Austin, TX

B.S. Computer Science, Dean's Scholars, Special Honors

May 2017

B.S. Mathematics, Dean's Scholars, Special Honors

May 2017

WORK & TEACHING EXPERIENCE

Carenegie Mellon University

Pittsburgh, PA

Postdoctoral Researcher in Computer Science

August 2023 - present

Supervisor: David Woodruff

- Conduct research to develop improved algorithms for fundamental problems in machine learning and numerical linear algebra

University of California Los Angeles

Los Angeles, CA

Graduate Student Instructor; Algorithms (M 182)

Spring 2023

- Independently taught a undergraduate course covering data structures and algorithms.

Teaching Assistant

2017-2023

- Taught a variety of college-level mathematics and programming courses.
Courses taught include:
 - PIC 10A: Introduction to programming in C++ (x11)
 - PIC 10B: Intermediate Programming in C++
 - M 164: Optimization
 - M 182: Algorithms (x3)
 - M 131A: Real Analysis (x3)

Assistant Mentor – Research Experience for Undergraduates

Summer 2022

- Mentored a team of undergraduates applying a variety of machine learning and data analysis techniques to a dataset provided by a company sponsor. Project utilized a hierarchical version of non-negative matrix factorization (NMF) to extract interpretable features from text data.

Art of Problem Solving

2016 - 2022

- As a summer intern in 2016 and 2017, developed math curriculum materials for top-performing middle and high school students which were subsequently utilized by thousands of students.
- From 2017-2022, taught a wide variety of online courses to top students, ranging from Python Programming to Counting and Probability.

SELECTED PUBLICATIONS

- *Improving the Communication Complexity of Convex Optimization*
with Mehrdad Ghadiri, Yin Tat Lee, Swati Padmanabhan, David Woodruff
and Guanghao Yi
STOC 2024
- *Fast Sampling Based Sketches for Tensors*
with David Woodruff
ICML 2024
- *Nearly Optimal Bounds for Cyclic Forgetting*
with Halyun Jeong, Mark Kong, Deanna Needell and Rachel Ward
NeurIPS 2023
- *SP2: A Second Order Stochastic Polyak Method*
with Deanna Needell, Robert Gower, Shuang Li and Martin Takac
ICLR 2023
- *Testing Positive Semi-Definiteness with Linear Measurements*
with Deanna Needell and David Woodruff
FOCS 2023
- *Quantile-Based Iterative Methods for Corrupted Systems of Linear Equations*
with Jamie Haddock, Deanna Needell and Elizaveta Rebrova
SIMAX 2022

HONORS & AWARDS

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| Pacific Journal of Mathematics Dissertation Award (UCLA) | 2023 |
| <ul style="list-style-type: none">• <i>Advisor: Deanna Needell</i> | |
| Smoky Mountains Data Challenge, Best Solution Runner Up
(Oak Ridge National Laboratory) | 2021 |
| <ul style="list-style-type: none">• <i>Proposed and implemented a novel sampling technique that improves data acquisition time for piezoelectric microscopy</i> | |
| Best Undergraduate Thesis in Computer Science (UT Austin) | 2017 |
| <ul style="list-style-type: none">• <i>Thesis advisor: Eric Price</i> | |

SKILLS

Python, NumPy, SciPy, Jupyter, PyTorch, C++, Git, Machine learning, Numerical linear algebra