Matthew Eichhorn

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Education

Cornell University August 2019 - Present
Ph.D., Applied Mathematics

University at Buffalo, *The State University of New York* August 2015 - May 2019
Bachelors of Science, Mathematics and Computer Science GPA: 4.0
Honors College, Dean's List
Thesis: *Neural Networks for Plant Species Recognition in Street View Imagery*

Relevant Coursework
Algorithms, Coding Theory, Data Models and Query Languages, Graph Theory and Network Flows, Algorithmic Game Theory, Matrix Computations, Algebra, Probability, Functional Analysis

Research Experience

Computer Science Department, University at Buffalo Spring 2018 - Summer 2019

- Compare neural network architectures through lens of arithmetic circuit complexity
- Explore theory for efficient neural networks utilizing structured matrices

Project GLASS, University at Buffalo Spring 2018 - Fall 2019

- Assess utility of Google Street View imagery to survey gardening practices in Thailand
- Heavily modify existing Neural Network architectures to assist in crop detection
- Develop Python and JavaScript utilities for image tagging and data processing

SCoRe Group, University at Buffalo Fall 2016 - Fall 2017

- Devised efficient methods to answer counting queries in Bayesian networks
- Implemented heavily-optimized C++ data structures to efficiently answer queries

Publication

- Ringland, J., Bohm, M., Baek, SR., and **Eichhorn, M.**, "Automated survey of selected common plant species in Thai homegardens using Google Street View imagery and a deep neural network". Earth Science Informatics (ESI), 2021
- Dao T., Sohoni N., Gu A., **Eichhorn, M.**, Blonder A., Leszczynski M., Rudra R., and Ré C., "Kaleidoscope: An Efficient, Learnable Representation For All Structured Linear Maps", In Proceedings of 8th International Conference on Learning Representations (ICLR), 2020
- Dao T., Gu A., **Eichhorn, M.**, Leszczynski M., Sohoni N., Blonder A., Rudra R., and Ré C., "Butterflies Are All You Need: A Universal Building Block for Structured Linear Maps", 2019
- Dao, T., Gu, A., **Eichhorn, M.**, Rudra, A., Ré, C., "Learning Fast Algorithms for Linear Transforms Using Butterfly Factorizations", In Proceedings of 36th International Conference on Machine Learning (ICML), 2019: 1517-1527.
- Karan, S., **Eichhorn, M.**, Hurlburt, B., Iraci, G. and Zola, J., "Fast Counting in Machine Learning Applications", In Proceedings of 34th Uncertainty in Artificial Intelligence (UAI), 2018: 540-549.

Employment Experience

Center for Teaching Innovation, Cornell University — May - September 2020
Course Designer

- Performed extensive audit of existing curriculum and materials for introductory calculus course
- Redesigned curriculum to be more approachable and engaging to students of varied backgrounds
- Developed class activities, course assignments and readings to facilitate active instruction

The Math Place, UB Undergraduate Learning Center — August 2017 - May 2019
Math Tutor

- Tutor students in subjects ranging from algebra and trigonometry to calculus
- Develop study strategies and crafted practice problems to aid students in test preparation

Enterprise Application Services, University at Buffalo — January 2016 - May 2017
Development Intern

- Revamped automated testing framework with simpler interface and expanded functionality
- Worked extensively with Selenium WebDriver, Docker, and Bamboo CI software
- Wrote extensive documentation and comprehensive testing suite

Teaching Experience

Cornell University

- *Teaching Assistant*: MATH 1106, Modeling with Calculus for the Life Sciences — Spring 2020

University at Buffalo

- *Teaching Assistant*: CSE 191, Discrete Structures — Fall 2017
- *Teaching Assistant*: CSE 250, Data Structures — Spring 2017, 2018
- *Teaching Assistant*: MTH 241, Calculus 3 — Spring 2017
- *Teaching Assistant*: MTH 141, Calculus 1 — Fall 2016

Awards and Recognition

Dean's Undergraduate Achievement Award, UB SEAS — Spring 2019
Undergraduate Researcher Award, UB Computer Science Department — Spring 2019
Dean's Outstanding Senior Award, UB College of Arts and Sciences — Spring 2019
Harriet F. Montague Award, UB Math Department — Fall 2018
Summer Math Scholarship, UB Math Department — Summer 2018
Grace W. Capen Academic Award, University at Buffalo — Spring 2017
Presidential Scholar, UB Honors College — Class of 2019
Eagle Scout, Boy Scout Troop 85 — October 2012

Technical Skills

Programming Languages: Python, C/C++, Java, SQL, XQuery, SML, Matlab, Prolog
Software: Microsoft Office, Linux, Git, LaTeX