

# Matthew Eichhorn

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## EDUCATION

### Cornell University

Ph.D., Applied Mathematics

August 2019 - Present

### University at Buffalo, *The State University of New York*

Bachelors of Science, Mathematics and Computer Science

August 2015 - May 2019

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

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## 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

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## 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.
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## 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

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## TEACHING EXPERIENCE

**Cornell University**

- *Teaching Assistant*: MATH 1106, 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

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## 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

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## TECHNICAL SKILLS

Programming Languages: Python, C/C++, Java, SQL, XQuery, SML, Matlab, Prolog

Software: Microsoft Office, Linux, Git, L<sup>A</sup>T<sub>E</sub>X

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