

Curriculum Vitae – Brandon Zhao

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EDUCATION

Caltech

September 2021 - Present

Ph.D., Computing and Mathematical Sciences

Pasadena, CA

- **GPA:** 4.2/4.0
- **Advisor:** Katherine L. Bouman
- **Relevant Coursework:** Machine Learning and Data Mining, Linear Analysis with Applications, Mathematical Optimization, Probability Theory and Stochastic Processes

Duke University

August 2017 - May 2021

B.S., Mathematics and Computer Science (Double Major)

Durham, NC

Minor: Statistical Science

- **GPA:** 3.9 / 4.0, Dean's List (x4)
- **Relevant Coursework:** Graduate Machine Learning, Design/Analysis of Algorithms, Applied Stochastic Processes, Advanced Probability, Measure and Integration, Statistical Inference

RESEARCH EXPERIENCE

Research Assistant

September 2021 - Present

Caltech Computing and Mathematical Sciences

Pasadena, CA

- Currently conducting research in computational imaging, with a focus on astrophysical applications

Undergraduate Researcher

May 2019 – June 2021

Duke Computer Science Department – CODE+ Program

Durham, NC

- Designed interpretable prototype-based neural network to classify images from large datasets into fine-grained subcategories
- Investigated different ways to interpret and improve network decisions with visualizations and addition of different prototype regularizations
- Increased performance and interpretability of previous model through addition of recurrent, explainable attention mechanism and secondary fine-grained prototype network

SURF Research Fellow

June 2020 - August 2020

NASA JPL – Machine Learning and Instrument Autonomy Group

Pasadena, CA (Remote)

- Designed and trained neural networks for finding and classifying objects of interest in unlabeled Mars Rover panoramic camera images using transfer learning technique
- Created custom multi-label dataset both for algorithm training and for use as a guideline for future human-labeling efforts
- Explored interpretable techniques for improving minority class performance with supervised learning through supplementary image annotations

Research Assistant

May 2018 - July 2018

Duke Mathematics Department – DOMath Program

Durham, NC

- Investigated properties of epidemic models on random graphs, specifically periodic trees, in small group environment
- Improved previous results by giving tighter bounds on significant growth rates for period three alternating trees
- Worked with group to summarize findings in paper and presentation at program conclusion (see Jiang, et al.)

PUBLICATIONS

Conferences:

“Single-View Refractive Index Tomography with Neural Fields”

Brandon Zhao, Aviad Levis, Liam Connor, Pratul P. Srinivasan, Katherine L. Bouman
Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition. 2024.

“This Looks Like Those: Illuminating Prototypical Concepts Using Multiple Visualizations”

Chiyu Ma*, **Brandon Zhao***, Chaofan Chen, Cynthia Rudin
Advances in Neural Information Processing Systems 36 (2024).

"Mars Image Content Classification: Three Years of NASA Deployment and Recent Advances"

Kiri Wagstaff, Steven Lu, Emily Dunkel, Kevin Grimes, **Brandon Zhao**, Jesse Cai, S.B. Cole, Gary Doran, Raymond Francis, Jake Lee, and Lukas Mandrake
The Thirty-Third Annual Conference on Innovative Applications of Artificial Intelligence (IAAI-21).

Published:

"The piecewise exponential distribution"

Gang Han, **Brandon Zhao**, Kendall Pye, Hongwei Zhao
Significance, 14(6), pp.10-11. 2017.

arXiv:

"The Contact Process on Periodic Trees"

Yufeng Jiang, Remy Kassem, Grayson York, **Brandon Zhao**, Xiangying Huang, Matthew Junge, Rick Durrett. 2018.

TEACHING EXPERIENCE

Teaching Assistant – Special Topics in Computer Science (CS 101) **January 2024 – March 2024**
Caltech Computing and Mathematical Sciences Pasadena, CA

- Mentored a team of three undergraduate students for a research project detecting radio frequency interference for the DSA-2000 telescope array using deep learning

Teaching Assistant - Graduate Machine Learning (CS 671) **August 2019 - December 2019**
Duke University Computer Science Department Durham, NC

- Assisted in grading problem sets and exams, held office hours, provided miscellaneous help to students through E-Mail or Piazza

Teaching Assistant - Graduate Basic Analysis (Math 531) **August 2018 - December 2018**
Duke University Mathematics Department Durham, NC

- Graded and wrote LaTeX solution documents for problem sets, assisted in grading midterm exams, provided help to students through E-Mail or by appointment

SKILLS, LANGUAGES, ACTIVITIES

Languages: Mandarin (Conversational)

Programming Languages: Familiar: Python, PyTorch, Jax, Competent: MATLAB, C, Java

Activities: Member of Delta Kappa chapter, Alpha Epsilon Pi fraternity