

LINGHAI LIU

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EDUCATION

Brown University

To be completed: May 2023

B.S. in Applied Mathematics - Computer Science

B.A. in Mathematics

Overall GPA: 4.0/4.0

RESEARCH

Undergraduate Researcher

May 2022 - Present

Brown University

Providence, RI

- Mentor: Prof. Stuart Geman
- Implement generative models capable of learning a richer collection of relationships using a hierarchy of idealized neurons. Their topological structures can be perturbed and potentially represent relationships.
- Design and use suitable objective (loss) functions and nonlinear mappings (layers) for existing neural networks and observe neural collapse effects over layers.

REU Researcher

May 2022 - July 2022

Emory University

Atlanta, GA

- Mentor: Prof. Samy Wu Fung
- Compare classical optimization, standard feed-forward networks (Denoising CNN), Deep Unrolling methods, and implicit deep learning with applications to inverse problems in imaging.
- Train implicit networks to denoise images using Jacobian-free Backpropagation with fixed memory costs, which yield comparable results with current models.
- Attend midterm and poster presentation. Give a seminar on GPU usage.

Undergraduate Research Assistant

January 2021 - August 2021

Learning Memory & Decision Lab, Brown University

Providence, RI

- Mentor: Prof. Matthew Nassar
- Explored biologically plausible approaches to generate beneficial noise correlations, i.e. passing back information from the decision layer, that make learning a discrimination task faster and more robust.

PROJECTS

Brown University Mathematics Project

Summer 2020

- Advised by Ph.D. student Juniper Cocomello, investigated the randomizing speed of Markov chains and proved the long-term probabilities of a finite-state Markov chain.

TEACHING

Brown University

- APMA1690: Computational Probability & Statistics (TA) Fall 2022
- APMA1740/2610*: Recent Applications in Probability & Statistics (TA) Spring 2022
- DATA1010*: Probability, Statistics and Machine Learning (TA) Fall 2021
- CSCI1470/2470*: Deep Learning (Head TA) Fall 2021
- APMA1650: Statistical Inference I (TA) Spring 2021

* Courses at graduate level

MENTORING

Meiklejohn Peer Advising Program

Peer Advisor

Fall 2020 - Spring 2021

Providence, RI

- Together with a faculty member, advised 5 freshmen on academic and career development, and provided them with mental guidance and support.

AWARDS & HONORS

Second place, Henry Parker Manning Mathematical Prizes, Brown University 2022

Undergraduate Teaching & Research Awards, Brown University 2021

Second place (tied), Hartshorn-Hypatia Freshman Math Contest, Brown University 2019

TECHNICAL STRENGTHS

Computer Languages	Python, Matlab, R, L ^A T _E X, Stata, Java, C
Languages	English, Mandarin, French