LINGHAI LIU

Mail 6583, 69 Brown St ◇ Providence, RI 02912

(401) 347-4178 ◇ linghai_liu@brown.edu

EDUCATION

Brown Univerisity   Expected 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 that embed a discrete-state system of multinomial units into a continuous-state system. The goal is to build a complex and multinomial idealization of biological neurons while ensuring model hierarchy and reusability.
· Design suitable objective (loss) functions and nonlinear mappings (layers) for existing neural networks and observe neural collapse effects over layers.

REU Researcher   May 2022 - Present
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
· A continuation to the work on how noise among input neurons would induce correlation structures that make learning a discrimination task faster and more robust.
· Explored other biologically plausible approaches to generate beneficial noise correlations, i.e. passing back information from the decision layer to other layers.

PROJECTS

Brown University Mathematics Project   Summer 2020

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

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

    *: graduate level

MENTORING

Meiklejohn Peer Advising Program   Fall 2020 - Spring 2021
Peer Advisor   *Providence, RI*

· Advised 5 freshmen with a faculty member; provided academic and career resources and mental support.

AWARDS & HONORS

2nd place, Henry Parker Manning Mathematical Prizes, Brown University   2022

Undergraduate Teaching & Research Awards, Brown University   2021

2nd place (tied), Hartshorn-Hypatia Freshman Math Contest, Brown University   2019

TECHNICAL STRENGTHS

Computer Languages   Python, Matlab, R, LaTeX, Stata, Java, C
Languages   English, Mandarin, French