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
GPA: 4.0/4.0

SELECTED RESEARCH EXPERIENCES

Topological Representations for Neural Networks May 2022 - Present
Advisor: Stuart Geman *Brown University*

- Design generative models capable of learning a richer collection of abstract relationships using a multinomial idealization of biological neurons while ensuring model hierarchy and reusibility.
- Implement the above models. Develop statistics that exploit the patterns of neuronal activities with topological structures such as cycles that can potentially be used to represent relationships.

Jacobian-free Backpropagation in Inverse Problems May 2022 - Present
Advisor: Samy Wu Fung *REU Researcher, Emory University*

- Compared classical optimization, standard feed-forward networks (Denoising CNN), Deep Unrolling methods, and implicit deep learning with applications to inverse problems in imaging.
- Trained implicit networks to denoise images using Jacobian-free Backpropagation with fixed memory costs, which yielded comparable results with current models.

Noise Correlations for Task Learning January 2021 - August 2021
Advisor: Matthew Nassar *Brown University*

- 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.

TEACHING & MENTORING

Teaching Assistant at Brown University

- CSCI1952Q: Algorithmic Aspects of Machine Learning (TA) Spring 2023
- APMA1660: Statistical Inference II (TA) Spring 2023
- 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

Peer Advisor, Meiklejohn Peer Advising Program Fall 2020 - Spring 2021

- Advised 5 freshmen on academic and career development jointly with a faculty member.

AWARDS & HONORS

Emory REU/RET Computational Mathematics for Data Science, Emory University 2022
Second place, Henry Parker Manning Mathematical Prizes, Brown University 2022
BrownConnect SPRINT 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, LaTeX, Stata, Java, C
Languages English, Chinese, French