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

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 - July 2022
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.
· Presented progress and results to the department via speech and poster presentation. Gave a seminar on GPU usage to the REU site.

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

· 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

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

AWARDS & HONORS

Emory REU/RET Computational Mathematics for Data Science, Emory University	2022
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, LaTeX, Stata, Java, C
Languages	English, Mandarin, French