Drake B. Brown

Undergraduate Student
Department of Mathematics
Brigham Young University
2021 to present

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https://github.com/brownthesr

Education

- **Brigham Young University** *2021–2025 (projected)*
  B.S. Applied Mathematics, Data Science Emphasis
  GPA 3.98
  Merit based department scholarship
  Advisor: Zachary M. Boyd

Primary Research Interests

- Graph Neural Network theory and explainability
- Geometric and equivariant deep learning
- Stochastic Optimization

Research Experience

- **Lead Assistant Researcher** *2022–present*
  Graph Neural Networks Lab
  - Performance bounds for graph neural networks
  - Autoencoders and graph time series
- **Computer Vision Intern** *Summer 2023*
  Air Force Research Lab
  - Computer Vision
  - Momentum encoders and self-supervised learning
- **Assistant Researcher** *2022–2023*
  Perception Cognition and Control Lab
  - Natural language processing
  - Narrative analysis of large language model outputs

Research Works

1. Drake B. Brown, Trevor B. Garrity, Kaden Brent Parker, Jason Travis Oliphant, Brigham Stone Carson, Cole Hanson, Zachary M. Boyd. *Global minima, recoverability thresholds, and higher-order structure in GNNs.* Submitted at SIAM.
2. Dustin Angerhofer, Drake B. Brown, Oliver Nina. *Understanding the dynamics of feature learning representations in non-contrastive self-supervised learning.* In progress.
3. Drake B. Brown, Dustin Angerhofer, Eli Childs, Zachary M. Boyd. *Modeling graph time series through stochastic differential equations in latent space.* In progress.
4. Dustin Angerhofer, Drake B. Brown, Trevor B. Garrity, Zachary M. Boyd. *Performance bounds of Transformers in modeling Hidden Markov Models.* In progress.

Presentations

- Talks
    1. Connecting the Performance of Graph Neural Network Architectures to the Properties of Training Data, BYU Student Research Conference, February 2024
    2. (Invited) Connecting the Performance of Graph Neural Network Architectures to the Properties of Training Data, 2^{nd} SIAM Northern States Section Conference, April 2023
- Posters
    1. Connecting the Performance of GNN Architectures to the Properties of Training Data, Northeast Regional Conference on Complex Systems, March 2023
- Accepted abstracts
    1. Global minima, recoverability thresholds, and higher-order structure in GNNs, Conference on Complex Systems, October 2023

Awards and Honors

- Math department deans list (2021-2024)
- Best presentation award, Student Research Conference BYU
- Outstanding Sophomore, BYU Mathematics Department

Programming and Development

- **Programming Languages** Python, Java, C++, Bash, LaTeX, Git
- **Python Libaries** PyTorch, NumPy, Pandas, NetworkX, PyTorch-Geometric, PyTorch-Lightning, Seaborn, Matplotlib

Citizenship

United States