Drake Brown

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Research interests: generative modeling (flow, score, and diffusion approaches).

Education

PhD, Applied Mathematics **April 2029**
University of Utah *Salt Lake City, Utah*

- Graduate Coursework: ODEs, PDEs, Functional Analysis, and Numerical Analysis
- Research interests: generative modeling (flow, score, and diffusion approaches)
- GPA: 4.00

BS, Applied & Computational Mathematics Emphasis (ACME), Computer Science Minor **April 2025**
Brigham Young University *Provo, Utah*

- Major GPA: 4.00
- Relevant Coursework:
  - Advanced Deep Learning
  - Mathematics of Deep Learning
  - Modeling with Uncertainty in Data
  - Modeling with Dynamics and Control Theory
  - Stochastic Differential Equations
  - Linear and Nonlinear Analysis
  - Algorithm Design and Optimization
  - Advanced Programming Concepts

Skills

- Proficient in Python (PyTorch, Lightning, NumPy, Pandas), SQL, C++, Java, Rust
  - Geometric Deep Learning
  - Dynamic Optimization
  - Data Structures
  - Numerical Linear Algebra

Experience

AWS Software Engineering Intern **Jun - Aug 2024, May 2025 - Aug 2025**
API Gateway, Amazon *Denver, Colorado*

- Re-architected Private API ingress by removing NGINX proxy layer and implementing direct traffic handling
- Designed and deployed isolation fleet to mitigate large-scale DDoS attacks across 300K+ accounts
- Increased successful API transactions by 30% via dynamic routing and system-level optimization
- Reduced p99 latency from 2000ms → 20ms under adversarial load

Research Assistant Lead **February 2022 – April 2025**
Graph Neural Networks Lab *Provo, Utah*

- Led large-scale experimentation training 200+ GNN models in parallel (15M+ data points) using PyTorch
- Invited talk at SIAM-NSS; paper submitted to SIAM

Air Force Research Intern **April – September 2023**
Self-Supervised Image Representation Learning Lab *Dayton, Ohio*

- Implemented momentum-based self-supervised models (BYOL, DINO) in PyTorch
- Outperformed state of the art results in self-supervised image learning on STL10 and Cifar100 by 4%

Projects & Publications

Projects in PyTorch, BYU **2024 - 2025**

- Trained hundreds of reinforcement agents in parallel to model strategies in the Prisoner's Dilemma
- Implemented equivariant neural ODE to model chaotic 3-body dynamics with symmetry constraints
- Created a context topic similarity search using sentence transformers (RoBERTa) for ancient texts
- Developed a Music Transformer to generate instrumental scores and interpolate between music genres

Publications

- *Beyond Linear: A Theoretical and Empirical Analysis of Nonlinear GNNs for Community Detection* — Revise & Resubmit, SIAM Journal on Applied Mathematics
- Submission under blind review, International Conference on Machine Learning, Jan 2026
- 2 preprints on arXiv (epidemiological modeling; multi-agent optimal control)