BO ZHAO

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RESEARCH INTEREST

Deep learning, optimization, parameter space symmetry

EDUCATION

University of California San Diego   2021 - present
Ph.D. in Computer Science
· Advisor: Rose Yu

Georgia Institute of Technology   2019 - 2021
M.S. Computer Science

University of Illinois at Urbana-Champaign   2016 - 2019
B.S. Computer Science *(with highest honors)*
B.S. Physics *(cum laude and departmental highest distinction)*

EXPERIENCE

IBM   06/2022 - 09/2022
AI Intern (Mentor: Nima Dehmamy)   Cambridge, MA
· Studied parameter space symmetry and conserved quantities in gradient flow.

PUBLICATIONS

Under Submission

[1] **Bo Zhao**, Robert M. Gower, Robin Walters, Rose Yu. Improving Convergence and Generalization Using Parameter Symmetries. *In submission. arXiv:2305.13404*, 2023.

[2] Tao Wang, **Bo Zhao**, Sicun Gao, Rose Yu. Understanding the Approximation Gap of Neural Networks. *In submission*, 2023.

Conference & Journal

[1] Salva Rühling Cachay, **Bo Zhao**, Hailey Joren, Rose Yu. DYffusion: A Dynamics-informed Diffusion Model for Spatiotemporal Forecasting. *Advances in Neural Information Processing Systems (NeurIPS)*, 2023.

[2] **Bo Zhao***, Iordan Ganev*, Robin Walters, Rose Yu, Nima Dehmamy. (*equal contribution) Symmetries, Flat Minima, and the Conserved Quantities of Gradient Flow. *International Conference on Learning Representations (ICLR)*, 2023.

[3] **Bo Zhao**, Nima Dehmamy, Robin Walters, Rose Yu. Symmetry Teleportation for Accelerated Optimization. *Advances in Neural Information Processing Systems (NeurIPS)*, 2022.

[4] Peter Eckmann, Kunyang Sun, **Bo Zhao**, Mudong Feng, Michael Gilson, Rose Yu. LIMO: Latent Inceptionism for Targeted Molecule Generation. *International Conference on Machine Learning (ICML)*, 2022.

[5] James Fox, **Bo Zhao**, Beatriz Gonzalez Del Rio, Sivasankaran Rajamanickam, Rampi Ramprasad, Le Song. Concentric Spherical Neural Network for 3D Representation Learning. *International Joint Conference on Neural Networks (IJCNN)*, 2022.

[6] Gregory A. Fields, Samuel F. Cieszynski, **Bo Zhao**, Kidan A. Tadesse, Mohammed A. Sheikh, Eugene V. Colla, and M. B. Weissman. Multiple Aging Mechanisms in Ferroelectric Deuterated Potassium Dihydrogen Phosphate. *Journal of Applied Physics* 125, 194102, 2019.

Workshop Abstracts

[1] **Bo Zhao**, Iordan Ganev, Robin Walters, Rose Yu, Nima Dehmamy. Charting Flat Minima Using the Conserved Quantities of Gradient Flow. *Symmetry and Geometry in Neural Representations Workshop (NeurReps)* at NeurIPS 2022.

[2] **Bo Zhao**, Iordan Ganev, Robin Walters, Rose Yu, Nima Dehmamy. A Noether's Theorem for Gradient Flow: Continuous Symmetries of the Architecture and Conserved Quantities of Gradient Flow. *Women in Machine Learning workshop (WiML)* at NeurIPS 2022.

[3] **Bo Zhao**, Nima Dehmamy, Robin Walters, Rose Yu. Symmetry Teleportation for Accelerated Optimization. **Contributed talk** at *Conference on the Mathematical Theory of Deep Neural Networks (DeepMath)*, 2022.

FELLOWSHIP

DeepMind Fellowship, 2023-2024

TEACHING

Teaching Assistant, CS 4641 Machine Learning, Georgia Tech	Fall 2020
Lead Course Assistant, CS 225 Data Structures, UIUC	Fall 2017 - Spring 2019

TALKS & PRESENTATIONS

Symmetries, Flat Minima, and the Conserved Quantities of Gradient Flow

· Boston Computation Club	July 2023
· AI TIME	May 2023

SERVICE

Reviewer   ICML (2022, 2023), NeurIPS (2022, 2023)