Manyuan (Angel) Tao

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Summary

Ph.D. graduate in Applied Mathematics, Statistics, and Scientific Computation from the University of Maryland, College Park, Dec 2023. Over 6 years of experience in quantitative research, focusing on stochastic modeling, computational methods, data-driven methods, and machine learning models. Proficient in Python, C, and MATLAB.

Technical Skills

Programming: Python (PyTorch, NumPy, Pandas, Matplotlib), C, C++, MATLAB, R, SQL, LaTeX
Quantitative: Stochastic processes, Computational PDEs, Numerical optimization, Machine learning

Education

Ph.D. in Applied Mathematics (GPA: 3.88/4.0) — College Park, MD
University of Maryland, College Park — Aug 2018 - Dec 2023
- Thesis co-advised by Zhigang Suo at Harvard University: Modeling the Fracture of Polymer Networks

M.S. in Mathematics (GPA: 3.80/4.0) — New York, NY
New York University, Courant Institute of Mathematical Sciences — Aug 2016 - May 2018
- Thesis advised by Andrew J. Majda: A Dynamical Model for Meridionally Asymmetric El Niño Events

B.S. in Computational Mathematics (GPA: 3.92/4.0; Rank: 1/122) — Xiamen, China
Xiamen University, China (National Ranking: 16/960) — Sep 2012 - Jun 2016
- Second Place Team in the Calculus World Cup 2016 hosted by National Taiwan University, BoniO Inc.

Work Experience

GenAI Specialist — Remote Work
Scale AI, Outlier Platform — Jan 2024 - Present
- Trained generative AI models on large-scale datasets to optimize LLM performance for math-related tasks.
- Tested, evaluated, and fine-tuned LLMs on real user prompts to improve accuracy, reliability, and safety.
- Delivered high-quality training data with over 98% accuracy for reinforcement learning by AI applications.

Globalink Research Intern — Montreal, QC
Université de Montréal, Department of Computer Science — Jun 2015 - Aug 2015
- Exploited second-order information in optimization algorithms for machine learning. Compared 5 different approximations of second-order derivatives. Applied to 3 route choice models. Evaluated model efficiency.
- Programmed Lanczos algorithm. Improved model efficiency by 16% compared to conjugate gradient (CG).

Research Projects

Machine Learning for Rare Events in Modeling the Fracture of Hydrogels — Jun 2021 - Dec 2023
- Developed a software package written in Python, C, and MATLAB for large-scale numerical simulations.
- Designed an adaptive learning rate schedule for the nonlinear optimization algorithm in training of deep neural networks (DNNs). Demonstrated fast, reliable, and robust convergence in over 8,000 simulations.
- Proposed a quantitative approach to predict rare fracture events by statistical analysis of the shortest path length distribution. Achieved over 94% accuracy in capturing the actual fracture events from simulations.

High-order Eikonal Solvers in 3D Based on Dial's Shortest Path Algorithm — Jun 2019 - May 2021
- Developed second-order algorithms that are one-pass and parallelizable for solving the 3D eikonal equation.
- Implemented shared-memory parallel programming using OpenMP on the Deepthought high-performance computing (HPC) cluster. Achieved an efficiency of 75% in parallelization using up to 32 threads.

Parallel Implementation of Communication-Avoiding CG Method — Jan 2017 - Aug 2017
- Implemented distributed-memory parallel programming using MPI on the Stampede supercomputer.
- Tested strong and weak scaling performance. Achieved the ideal linear speedup using up to 16 processors.

Publications

1. **Manyuan Tao**, Shawn Lavoie, Zhigang Suo, and Maria Cameron. *The effect of scatter of polymer chain length on strength*. Extreme Mechanics Letters, p. 102024, June 2023.
2. **Manyuan Tao**. *Modeling the fracture of polymer networks*. PhD dissertation, University of Maryland, Dec 2023.