Hongli (Bob) Zhao

(415)-518-0826
honglizhaobob@uchicago.edu
LinkedIn: Hongli (Bob) Zhao

Education

06/2021 – 06/2026 (Expected) **Ph.D. in Computational and Applied Mathematics**.
THE UNIVERSITY OF CHICAGO
- Awards: Physical Sciences Division McCormick Fellowship, International House Fellowship
- Societies: Maroon Capital Executive Board, Graduate Council A&P Fund, Dean's Student Advisory Committee

08/2018 – 05/2021 **B.A. Applied Mathematics, Data Science**, *GPA: 4.00/4.00.*
UNIVERSITY OF CALIFORNIA, BERKELEY
- Awards: Highest Honors in General Scholarship (Top 3%), Highest Honors in Applied Mathematics, Dean's List (Top 10%), SURF Letters & Sciences Research Fellowship, Phi Beta Kappa
- Societies: ASUC Chief Financial Office, Berkeley Investment Group, Computer Science Mentors

Technical Skills & Activities

Programming: Python (Pandas, PyTorch, TensorFlow), Julia, C++, R, Java, SQL, MATLAB, Git, Bash, Linux, Excel
Coursework: Numerical methods, Linear Statistical Models, Nonlinear Optimization, Machine Learning Theory, Stochastic Calculus
Competitions: 2023 Schonfield PhD Datathon (2nd place), 2023 Akuna Capital Options 201, 2021 West Coast Citadel DataOpen

Professional Experience

Quant Strategist Summer Associate, GOLDMAN SACHS ASSET MANAGEMENT New York City, 06 – 08/2024
- **Portfolio Backtesting**: Productionized a backtesting and hypothesis testing framework (Python) for private equity portfolios with $279B effective value. Reduced risk by identifying 4% of active positions with data issues; findings presented and used for internal model validation.

Quant Research Mentee, J.P. MORGAN CHASE (EQUITY DERIVATIVES GROUP) New York City, 06 – 08/2024
- **Deep Learning**: Implemented ensemble and attention-LSTM (PyTorch) for financial time series forecasting with GARCH adjusted return feature, improving out-of-sample accuracy by 15% compared to LSTM. Authored a 17 page report used for mentorship training.
- **Option Pricing**: Developed C++ modules for European & American options pricing using tree-based and dynamic programming approach.

Givens Associate, ARGONNE NATIONAL LABORATORY (MCS DIVISION) Lemont, IL 05/2023 – 03/2024
- **Physics-Informed Machine Learning**: Developed physics informed neural networks (PyTorch) for Fokker Planck equations, achieved 70% Monte Carlo sample reduction for efficient simulations of large power system models. Authored and submitted 2 publications in 3 months.

Quant Trading Intern, FINALYZE CAPITAL, LLC, Chicago, IL 06 – 09/2022
- **Systematic Strategies**: Developed and backtested SMA confluence and cointegrated pairs trading for low frequency currency futures.
- **Hyperparameter Optimization**: Proposed a mixed-variable particle swarm optimization parallelized hyperparameter search over different markets. Achieved a 75% runtime reduction on Sharpe maximization of pairs trading compared to Bayesian search.
- **Reinforcement Learning**: Applied deep Q-networks to develop `RLPack`, a plug-in trading strategy adaptive training framework. Achieved an average of 6% annualized excess return (15% maximum) out-of-sample across 15 currency pairs in a pairs trading strategy.

Selected Manuscripts

Continuous-Time Overlapping Schwarz Scheme for PDE-constrained Optimal Control
Hongli Zhao, Mihai Anitescu *Submitted to SIAM Optimization*
- Proposed a novel approach for long-horizon optimal control using path-space optimization with adjoint equations. Developed a Julia module for distributed solutions. Improved runtime from cubic to linear compared to nonlinear optimization with discrete variables.

Scalable Maximum Likelihood Estimation over Graphs
Hongli Zhao, Yian Chen, Mihai Anitescu *Submitted to IJUQ*
- Developed a method for large-scale parameter inference of Gaussian processes on manifolds. Implemented Julia library, `GPHodlr.jl` (2000+ lines of functional code), using hierarchical matrices for scalable linear algebra, achieving log-factor runtime and storage reduction.

Tensorizing-Flows: A Tool for Variational Inference *Submitted to JMLR*
Hongli Zhao, Michael Lindsey, Yuehaw Khoo [*arxiv:2305.02460*] [*DSI Summer School*].
- Pioneered an improvement to deep normalizing flow for high-dimensional data with tensor network ansatz. Developed fast sampling algorithm scaling linearly in dimensions. Achieved $> 80\%$ reduction in evidence lower bound compared to ResNet with physics applications.

High-dimensional density estimation with tensorizing flow [*Springer Research in Mathematical Sciences*]
Yinuo Ren, Hongli Zhao, Yuehaw Khoo, Lexing Ying
- Developed tensor network sketching algorithm scaling linearly in dimensions and theory for compressing Markov graphical models in physics.

Data-driven Assimiation and Closures of Multiscale Stochastic Dynamics
Tyler Maltba, Hongli Zhao, Daniel Adrian Maldonado [*arxiv:2312.10243*] *accepted at SIAM Scientific Computing*
- Developed a data-driven finite volume numerical solver for learning Fokker-Planck equations from stochastic dynamics data. Collaborated with Los Alamos and Argonne National Lab on reduced-order simulations of multiscale stochastic power system models.

Leadership & Academic Experience

Mentorship : UChicago Math Directed Reading, UChicago CAM PhD Symposium, Berkeley Education Opportunity Program
Teaching Assistant: Numerical Analysis, Numerical PDEs, Machine Learning, Data Science Research & Discovery, Data Structures
Volunteering: Microsoft TEALS 2021–2022 (AP intro to CS), Google Summer of Code (SageMath), Journal Reviewer (IJUQ)
Workshops: Speaker at 2023 SIAM Dynamical Systems, ICERM 2023, AI & Dynamics Common Task Framework 2023