Jiaxin (Margot) Yuan

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Education

Ph.D. in Applied Mathematics, University of Maryland | College Park, MD | May 2025 | GPA: 3.84/4.00
- Area of interest: Stochastic differential equation, Molecular dynamics, Machine learning, Optimal control
- Advisor: Maria Cameron

B.S. in Mathematics, The Pennsylvania State University, State College, PA| May 2020
- Minor in **Economics** | **Schreyer Honors College** | Honor Roll and best student award every year| **GPA:** 4.0/4.0
- Dean's list; The President's Freshman Award; The President Sparks Award

Publications and Preprints

- **Jiaxin Yuan**, Amar Shah, Channing Bentz, and Maria Cameron. *Optimal control for sampling the transition path process and estimating rates*. Communications in Nonlinear Science and Numerical Simulation, 2023. Accepted.
- Xiaoyu Liu, **Jiaxin Yuan,** Bang An, Yuancheng Xu, Yifan Yang, and Furong Huang. *C-Disentanglement: Discovering Causally-Independent Generative Factors under an Inductive Bias of Confounder*. International Conference on Machine Learning (ICML) workshop on Structured Probabilistic Inference & Generative Modeling, 2023.
- Xiaoyu Liu, **Jiaxin Yuan,** Bang An, Yuancheng Xu, Yifan Yang, and Furong Huang. *C-Disentanglement: Discovering Causally-Independent Generative Factors under an Inductive Bias of Confounder*. Conference on Neural Information Processing Systems (NeurIPS), 2023.

Research Projects

Discovery of collective variables that minimizes error from model reduction| University of Maryland

College Park, MD | May 2023 - Current
- Introduces a method to learn collective variables that preserves original dynamics with variational autoencoder

Optimal controller and estimation of transition rate in Transition Path Theory | University of Maryland

College Park, MD | May 2022 – June 2023
- Derived an optimal controller that is applicable to both overdamped Langevin dynamics and full Langevin dynamics
- Developed an innovative method for estimating the transition rate of rare events with high precision, by using information from optimal controlled processes under the framework of Transition Path Theory
- Obtained transition rates for rare transitions effectively and robustly with simulation of controlled process using committors from reduced model or rough approximation, outperforming ones from Transition Path Theory formula
- Improved the accuracy of estimating transition rate by at most 200% in high-dimensional systems

C-Disentanglement: Discovering Causally-Independent Generative Factors under an Inductive Bias of Confounder | University of Maryland

College Park, MD | September 2022 – June 2023
- Learned causally disentangled representation with inductive bias of confounder, and proved bounded interventional robustness
- Provided a unified framework that solves the conflict between human annotated-labels and causally disentangled representation

Computing Committor function using the tensor train format |University of Maryland

College Park, MD | October 2021— April 2022
- Solved high dimensional committor function using tensor train format in Python
- Adapted the method to example with Mueller's potential in 2D, whose results outperformed the ones solved by neural network

Pricing and hedging variable annuity via Monte Carlo simulation | The Pennsylvania State University
State College, PA| August 2018 – May 2020

- Created a pricing estimation model for Variable Annuity via Monte Carlo simulation in C++ for different assumptions
- Constructed various methods of hedging strategies and made comparisons under different scenarios

Matrix Lie Groups | The Pennsylvania State University
State College, PA| June 2019 - August 2019

- Accomplished REU project report and presented at the poster symposium with literature reviews in the fundamentals of matrix Lie groups and application in integrability of Lie systems

Skills

Programming: Proficient in Python (Pandas, PyTorch, NumPy, Scikit-learn, Matplotlib), MATLAB, R, C++ , LaTex

Languages: English, Mandarin, Cantonese

Leadership

Secretary | Women in Math

College Park, MD | October 2021— April 2022

- Provided support for the organization running via recording minutes and advertising events through emails and social media

Teaching Assistant | University of Maryland

College Park, MD | October 2021— Current

- Guided discussion sessions in pre-calculus, calculus I, II, and fundamental statistic courses and taught pre-calculus as sole instructor
- Helped supervising REU program in summer 2022 as a teaching assistant

Sisterhood Development chair | Kappa Beta Gamma Phi Chapter

Harrisburg, PA | April 2017 - December 2017

- Led and organized a trip to Eastern State Penitentiary and raised funding from educational institutions
- Organized weekly and monthly bonding events for new members and other active members