Jiaxin (Margot) Yuan

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Education

Ph.D. in Applied Mathematics and Statistics, and Scientific Computation, University of Maryland | College Park, MD | May 2026 | GPA: 3.84/4.00
- Area of interest: Stochastic differential equation, Molecular dynamics, Deep learning, Causal inference, Large language models (LLMs), Vision language models (VLMs), Generative models
- Advisor: Maria Cameron

M.S. in Applied Mathematics and Statistics, and Scientific Computation, University of Maryland | College Park, MD | August 2024 | GPA: 3.84/4.00

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
- Dean's list; The President's Freshman Award; The President Sparks Award

Selected Publications and Preprints

- Xiaoyu Liu, **Jiaxin Yuan***, Yuhang Zhou, Jingling Li, Furong Huang, Wei Ai. *CSRec: Rethinking Sequential Recommendation from A Causal Perspective.* SIGIR 2025. arXiv: 2409.05872. **equal contribution*
- Zezheng Song*, **Jiaxin Yuan*** and Haizhao Yang. *Fmint: Bridging human designed and data pretrained models for differential equation foundation model.* Advanced Theory and Simulations. 2025. **equal contribution.*
- **Jiaxin Yuan**, Shashank Sule, Yeuk Yin Lam, Maria Cameron. *Learning collective variables that respect permutational symmetry.* arXiv preprint arXiv:2507.00408
- **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. Volume 129, February 2024, 107701.
- 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.

Work Experience

Waymo, Mountain View, CA   May 2025 – Aug 2025
Machine Learning Engineering Intern in the Perception team, hosted by Akshay Smit.
- Design and train machine learning models on real-world sensor data
- Make use of Vision-Language Models (VLMs) to improve long-tail detection ability of perception system running on an autonomously-driven vehicle

Apple, Cupertino, CA   May 2024 – Aug 2024
PPO Hardware Engineering Intern in the OLED team, hosted by Yun Liu.
- Improves display production process using machine learning algorithm
- Explores accelerating optical simulation in design

Research Projects

Multimodal foundation model for accelerating numerical simulation of stochastic differential equations via error correction | University of Maryland
College Park, MD | May 2025 - Current
- Proposes a generic image editing algorithm to reduce spurious correlation between labels and other factors
- Introduces efficient and accurate control by optimizing the latent variables at one single time step in latent diffusion model

Benchmark dataset for examining reasoning of LLMs in formal mathematics proof questions | University of Maryland |College Park, MD | May 2025 - Current
- Design a dataset of mathematical proof questions spanning ~12 topics from undergraduate and graduate-level courses, presented in both natural language and Lean4

- Developed transformed and ad-hoc variants of the original questions to evaluate models' reasoning and comprehension abilities

Image-text alignment in VLM with iterated learning | University of Maryland

College Park, MD | June 2024 - Current
- Proposes to improve image-text alignment in VLM with the aid of stable diffusion model in reconstruction
- Avoids supervised fine-tuning with expensive human labeled data

Bridging human designed and data pretrained models for differential equation foundation model | University of Maryland | College Park, MD | January 2024 – January 2025
- Introduces a generative pre-trained model that synergizes the precision of human-designed algorithms with the adaptability of data-driven methods
- Demonstrated exceptional generalization across a broad spectrum of real-world applications via incorporating in-context learning and has been pre-trained on a diverse corpus of 500,000 dynamical systems

Rethinking Sequential Recommendation from A Causal Perspective | University of Maryland

College Park, MD | January 2024 – August 2024
- Proposed the first analytical framework that explicitly isolates the processes of recommendations and users' natural selection and considers how various factors causally and collaboratively influence users' decisions
- Applied the framework to a wide range of recommendation scenarios and integrated into existing recommender systems for improvement that demonstrates competitive results across various baselines.

Learning collective variables that respect permutational symmetry | University of Maryland

College Park, MD | May 2023 – May 2025
- Proposed a numerical framework for learning collective variables that respect translational, rotational, and permutational symmetries, and for estimating transition rates and residence times
- Combined a sort-based featurization, residence manifold learning in the feature space, and learning collective variables with autoencoders whose loss function utilizes the orthogonality relationship

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 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

Skills

Programming: Proficient in Python (Pytorch, Jax, TensorFlow), 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