

YULAI ZHAO

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RESEARCH INTERESTS

Reinforcement Learning, Diffusion Models, LLMs

EDUCATION

Princeton University, Department of Electrical and Computer Engineering 2022 - Present

- Ph.D. in Machine Learning
- Advisor: S.Y. Kung

Princeton University, Department of Electrical and Computer Engineering 2022 - 2024

- M.A. in Electrical and Computer Engineering
- Advisor: S.Y. Kung

Tsinghua University, Department of Electronic Engineering 2018 - 2022

- B.Eng. in Electronic Information Science and Technology
- Advisors: Simon S. Du, Hongwei Chen

RESEARCH INTERNSHIPS

Tencent AI Lab May 2025 - Aug 2025

- Research Intern - Language Intelligence Research Group
- Identified systematic vulnerabilities in LLM-based reward models to superficial responses and developed a data augmentation strategy to enhance their robustness.
- Mentors: Dian Yu, Dong Yu

Magnit Global @ Genentech Sept 2024 - Dec 2024

- Machine Learning Scientist
- Employed by Magnit Global to conduct research at Genentech.
- Developed novel generative models for protein/RNA design to contribute to the drug discovery process.
- Mentors: Gabriele Scalia, Ehsan Hajiramezanali, Masatoshi Uehara

Genentech — BRAID (Biology Research | AI Development) May 2024 - Aug 2024

- Research Intern - Fundamental ML and Generative AI, DELTA Lab
- Affiliated to gRED (Research & Early Development) Computational Science.
- Worked on diffusion models specifically tailored for DNA/RNA sequences.
- Mentors: Ehsan Hajiramezanali, Masatoshi Uehara

PUBLICATIONS

* denotes equal contribution or alphabetical ordering.

Conference Proceedings

1. Derivative-Free Guidance in Continuous and Discrete Diffusion Models with Soft Value-Based Decoding

Xiner Li, **Yulai Zhao**, Chenyu Wang, Gabriele Scalia, Gokcen Eraslan, Surag Nair, Tommaso Biancalani, Shuiwang Ji, Aviv Regev, Sergey Levine, Masatoshi Uehara
Conference on Neural Information Processing Systems (NeurIPS) 2025

2. Reward-Guided Refinement in Diffusion Models With Applications to Protein and DNA Design

Masatoshi Uehara, Xingyu Su, **Yulai Zhao**, Xiner Li, Aviv Regev, Shuiwang Ji, Sergey Levine, Tommaso Biancalani
International Conference on Machine Learning (ICML) 2025

3. **Adding Conditional Control to Diffusion Models with Reinforcement Learning**
Yulai Zhao*, Masatoshi Uehara*, Gabriele Scalia, Sunyuan Kung, Tommaso Biancalani, Sergey Levine, Ehsan Hajiramezanali
International Conference on Learning Representations (ICLR) 2025
4. **Bridging Model-Based Optimization and Generative Modeling via Conservative Fine-Tuning of Diffusion Models**
 Masatoshi Uehara*, **Yulai Zhao***, Ehsan Hajiramezanali, Gabriele Scalia, Gökçen Eraslan, Avantika Lal, Sergey Levine, Tommaso Biancalani
Conference on Neural Information Processing Systems (NeurIPS) 2024
5. **Feedback Efficient Online Fine-Tuning of Diffusion Models**
 Masatoshi Uehara*, **Yulai Zhao***, Kevin Black, Ehsan Hajiramezanali, Gabriele Scalia, Nathaniel Lee Diamant, Alex M Tseng, Sergey Levine, Tommaso Biancalani
International Conference on Machine Learning (ICML) 2024
6. **Provably Efficient CVaR RL in Low-rank MDPs**
Yulai Zhao*, Wenhao Zhan*, Xiaoyan Hu*, Ho-fung Leung, Farzan Farnia, Wen Sun, Jason D. Lee
International Conference on Learning Representations (ICLR) 2024
7. **Local Optimization Achieves Global Optimality in Multi-Agent Reinforcement Learning**
Yulai Zhao, Zhuoran Yang, Zhaoran Wang, Jason D. Lee
International Conference on Machine Learning (ICML) 2023
8. **Blessing of Class Diversity in Pre-training**
Yulai Zhao, Jianshu Chen, Simon S. Du
International Conference on Artificial Intelligence and Statistics (AISTATS) 2023
 (Oral presentation & notable paper, 2% acceptance rate)
9. **Provably Efficient Policy Gradient Methods for Two-Player Zero-Sum Markov Games**
Yulai Zhao, Yuandong Tian, Jason D. Lee, Simon S. Du
International Conference on Artificial Intelligence and Statistics (AISTATS) 2022

Working Papers

1. **One Token to Fool LLM-as-a-Judge**
Yulai Zhao, Haolin Liu, Dian Yu, S.Y. Kung, Haitao Mi, Dong Yu
arXiv preprint
2. **Iterative Distillation for Reward-Guided Fine-Tuning of Diffusion Models in Biomolecular Design**
 Xingyu Su, Xiner Li, Masatoshi Uehara, Sunwoo Kim, **Yulai Zhao**, Gabriele Scalia, Ehsan Hajiramezanali, Tommaso Biancalani, Degui Zhi, Shuiwang Ji
arXiv preprint
3. **Inference-Time Alignment in Diffusion Models with Reward-Guided Generation: Tutorial and Review**
 Masatoshi Uehara, **Yulai Zhao**, Chenyu Wang, Xiner Li, Aviv Regev, Sergey Levine, Tommaso Biancalani
arXiv preprint
4. **Understanding Reinforcement Learning-Based Fine-Tuning of Diffusion Models: A Tutorial and Review**
 Masatoshi Uehara*, **Yulai Zhao***, Tommaso Biancalani, Sergey Levine
arXiv preprint
5. **Fine-Tuning of Continuous-Time Diffusion Models as Entropy-Regularized Control**
 Masatoshi Uehara*, **Yulai Zhao***, Kevin Black, Ehsan Hajiramezanali, Gabriele Scalia, Nathaniel Lee Diamant, Alex M Tseng, Tommaso Biancalani, Sergey Levine
arXiv preprint
6. **Optimizing the Performative Risk under Weak Convexity Assumptions**
Yulai Zhao
NeurIPS 2022 Workshop on Optimization for Machine Learning

International Conference on Artificial Intelligence and Statistics (AISTATS) Notable Paper *2023*

Scholarship of Academic Excellence

2019,2020

Awarded to Tsinghua students ranking top 5 %.

Toyota Scholarship

2019

Awarded to the department's top 3 out of 260+ students.

Top 10 in the *Infinity of Math* Competition

2018

Awarded to students outperforming 150+ participants in the school-wide calculus contest.

PROGRAMMING AND COMPUTING SKILLS

- Proficient: Python (NumPy, PyTorch, pandas)
- Intermediate: MATLAB, C/C++, Kdb+