Yuchen Liang

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EDUCATION

University of Illinois at Urbana-Champaign – Champaign, IL

Ph.D., Electrical and Computer Engineering, Aug 2019 – Aug 2023

- Advisor: Venugopal V. Veeravalli
- Dissertation: *Quickest Change Detection under Post-change Non-stationarity and Uncertainty*

University of Illinois at Urbana-Champaign – Champaign, IL

B.S., Computer Engineering, Aug 2015 – May 2019

RESEARCH INTERESTS

Summary: My research spans multiple disciplines—including machine learning, statistical signal processing, and information theory—with a focus on generative models and anomaly detection, centered on the following key directions:

- **Diffusion models**: The goal is to develop fundamental theories and improved algorithms for diffusion models, focusing on their convergence properties and sampling mechanisms, with an emphasis on enhancing sampling speed and quality.
- **Controlled generative models**: I aim to develop fine-tuning algorithms that steer the outputs of pre-trained generative models, particularly diffusion models, toward desired conditions, typically by defining a reward function and applying reinforcement learning (RL) methods.
- **Quickest anomaly detection**: The goal is to develop quickest anomaly detection methods for time-sequenced data under distributional uncertainty and to establish their optimality guarantees.

RESEARCH EXPERIENCE

AI-EDGE Postdoctoral Scholar

The Ohio State University – Columbus, OH | Sep 2023 – Present

- Conduct research on the theory of diffusion models, including both continuous and discrete diffusion models, focusing on convergence analysis, accelerated samplers, and zero-shot conditional sampling algorithms.
- Collaborate with AI-EDGE faculties and postdoctoral researchers on joint research initiatives.
- Mentor four first-year Ph.D. students through regular weekly meetings.

Graduate Researcher

Coordinated Science Laboratory, UIUC – Champaign, IL | Aug 2019 – Aug 2023

- Performed research on optimal online anomaly detection methods under non-stationary observations and uncertain likelihood functions, with a focus on distribution mismatch and joint estimation–detection approaches.
- Collaborated with researchers from the Army Research Lab as part of the Internet of Battlefield Things (IoBT) program.

PUBLICATIONS

1. **Y. Liang**, R. Huang, L. Lai, N. Shroff, Y. Liang. Absorb and Converge: Provable Convergence Guarantee for Absorbing Discrete Diffusion Models. In *The Thirty-ninth Annual Conference on Neural Information Processing Systems (NeurIPS),* 2025.
2. **Y. Liang**, Y. Liang, L. Lai, N. Shroff. Discrete Diffusion Models: Novel Analysis and New Sampler Guarantees. In *The Thirty-ninth Annual Conference on Neural Information Processing Systems (NeurIPS),* 2025.
3. **Y. Liang**, P. Ju, Y. Liang, N. Shroff. Theory on Score-Mismatched Diffusion Models and Zero-Shot Conditional Samplers. In *The Thirteenth International Conference on Learning Representations (ICLR),* 2025.
4. **Y. Liang**, P. Ju, Y. Liang, N. Shroff, Broadening Target Distributions for Accelerated Diffusion Models via a Novel Analysis Approach. In *The Thirteenth International Conference on Learning Representations (ICLR),* 2025.
5. J. Z. Hare*, **Y. Liang***, L. Kaplan, V. V. Veeravalli. Bayesian Two-Sample Hypothesis Testing using the Uncertain Likelihood Ratio. In *IEEE Transactions on Signal Processing*, 2025. (*Equal Contribution)

6. J. Z. Hare, **Y. Liang**, L. Kaplan, V. V. Veeravalli. On Network Quickest Change Detection with Uncertain Models: An Experimental Study. In *27th International Conference on Information Fusion (FUSION)*, 2024.
7. **Y. Liang**, V. V. Veeravalli. Quickest Change Detection with Post-Change Density Estimation. In *IEEE Transactions on Information Theory*, 2024.
8. L. Xie*, **Y. Liang***, V. V. Veeravalli. Distributionally Robust Quickest Change Detection. In *The Twenty-seventh International Conference on Artificial Intelligence and Statistics (AISTATS),* 2024. (*Equal Contribution)
9. **Y. Liang**, V. V. Veeravalli. Quickest Change Detection with Leave-one-out Density Estimation. In *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP),* 2023.
10. **Y. Liang**, A. G. Tartakovsky, V. V. Veeravalli. Quickest Change Detection with Non-Stationary Post-Change Observations. In *IEEE Transactions on Information Theory,* 2023.
11. **Y. Liang**, V. V. Veeravalli. Non-Parametric Quickest Mean-Change Detection. In *IEEE Transactions on Information Theory*, 2022.
12. **Y. Liang**, V. V. Veeravalli. Quickest Detection of Composite and Non-Stationary Changes with Application to Pandemic Monitoring. In *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP),* 2022.
13. **Y. Liang**, V. V. Veeravalli. Non-Parametric Quickest Detection of a Change in the Mean. In *55th Annual Conference on Information Sciences and Systems (CISS),* 2021.

INVITED TALKS

- "Non-Asymptotic Convergence of Discrete-time Diffusion Models: New Approach and Improved Rate," *INFORMS Annual Meeting*, Seattle, Oct 2024.
- "Theory on Score-Mismatched Diffusion Models and Zero-Shot Conditional Samplers," *AI-EDGE SPARKS Seminar*, Ohio State University, Oct 2024.

TEACHING & MENTORING

- Mentor to 10 undergraduates in NSF REU program (Summer 2024, 2025)
- Instructor, Deep Generative Models for REU students (Summer 2024, 2025)
- Advisor, *Faith Works* undergraduate organization, OSU (Sep 2024 – Present)
- TA, *ECE 365: Data Science and Engineering*, UIUC (Aug 2020 – Dec 2022)

PROFESSIONAL SERVICE

- Chair, AI-EDGE SPARKS Seminar Series, Spring 2025 – Present.
- Executive Organizing Committee Member, NSF REU Program, Summer 2025.

REVIEW SERVICE

- IEEE Transactions on Information Theory
- IEEE Transactions on Signal Processing
- IEEE Transactions on Signal and Information Processing over Networks
- Sequential Analysis
- INFORMS Journal on Data Science
- Communications in Statistics - Theory and Methods
- Journal of Statistical Planning and Inference (JSPI)
- IEEE Transactions on Networking
- Annual Conference on Neural Information Processing Systems (NeurIPS)
- IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)
- IEEE Information Theory Workshop (ITW)
- IEEE International Symposium on Information Theory (ISIT)