Yuchen Liang

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EDUCATION

Ph.D. in Electrical and Computer Engineering *August 2019–August 2023*

- **Concentration**: Data Science and Signal Processing

B.S. in Computer Engineering *August 2015–May 2019*

University of Illinois at Urbana-Champaign (UIUC)

Research Expertise: Generative models, Anomaly detection, Bayesian analysis, Time-series

RESEARCH EXPERIENCE

Postdoc Scholar @ OSU *September 2023–Present*

- Accelerated state-of-the-art **diffusion generative models** (e.g., DDPMs) from theoretical perspectives
- Optimized a **zero-shot** conditional diffusion sampler for the noisy linear **inverse problem**
- Found that the optimized sampler numerically achieves 1/10 of the convergence error given similar computation resources than previous ones
- Conducted real-image experiments in **PyTorch** to showcase algorithmic superiority
- Presented at the annual meeting of INFORMS, the largest data science professional association

Research Assistant @ UIUC *August 2019–August 2023*

- Studied the online **anomaly detection** problem when the anomalous distribution is not fully known
- Proposed ~10 anomaly detectors for **sequential data** and proved their **statistical** performances
- Showed that these detectors reduce the sample size (up to 1/6) for training and detection required of classical algorithms at similar false alarm levels
- Validated practical effectiveness of proposed algorithms with **health data** (e.g., COVID-19 infection), **time-series** data from **InfluxDB** database (e.g., ultrasonic, human sensors), and GPX data
- Published ~10 peer-reviewed papers as first and co-first author in top journals and conferences, such as IEEE-IT, AISTATS, and ICASSP

INTERNSHIP EXPERIENCE

Data Science Intern @ Corteva Agriscience *May–August 2022*

- Predicted insecticidal protein levels across various plant transgenic designs for product development
- Cleaned and transformed **bio-genetic** data with ~130,000 records and ~10 categorical features with **Pandas** and **Dask**, encoding features, merging tables, and creating visualizations on **Kubeflow**
- Built and optimized 2 ML **regression** models (including **XGBoost**) using **Scikit-learn**
- Reduced baseline RMSLE by 0.25 and performed detailed error analysis
- Presented data-collection suggestions to bio-scientist coworkers

OTHER MENTORED/PERSONAL PROJECTS

- **GestureVision**: Augmented the existing ASL Alphabet gesture image dataset by **fine-tuning** DDPM and performed preliminary gesture recognition using **Vision Transformer (ViT)**
- **Art Generation**: Generated Monet-style art pieces through Neural Style Transfer (NST), initializing content images with **DCGAN** and obtaining style images from VGG19 from 1000 Monet's paintings
- **NLP:** Performed ML-based Yelp-review sentiment analysis with NLTK; Built deep-learning Polish part-of-speech (POS) tagging algorithms, including a **Bi-LSTM** model with attention mechanism
- **Time-series Anomaly Detector:** Compared classical tree-based and deep-learning based anomaly detectors on high-dimensional time-series data

COMPUTER SKILLS

- **Languages & Libraries:** Python (PyTorch, Numpy, Numba, Matplotlib, Pandas, Dask, Scikit-learn), SQL, R, Bash, Java, C++
- **Frameworks & Applications:** AWS, Git, Jupyter Notebook, PostgreSQL, Docker, Tableau
- **Certificates:** Deep Learning Specialization (DeepLearning.AI), AWS Solution Architect (SAA-C03)

PEER-REVIEWED PUBLICATIONS

1. **Y. Liang**, P. Ju, Y. Liang, N. Shroff, "Theory on Score-Mismatched Diffusion Models and Zero-Shot Conditional Samplers," in submission to *ICLR 2025*.
2. **Y. Liang**, P. Ju, Y. Liang, N. Shroff, "Broadening Target Distributions for Accelerated Diffusion Models via a Novel Analysis Approach," in submission to *ICLR 2025*.
3. J. Z. Hare, **Y. Liang**, L. M. Kaplan, V. V. Veeravalli, "On Network Quickest Change Detection with Uncertain Models: An Experimental Study," International Conference on Information Fusion (FUSION), 2024.
4. L. Xie*, **Y. Liang*** and V. V. Veeravalli, "Distributionally Robust Quickest Change Detection using Wasserstein Uncertainty Sets," in *International Conference on Artificial Intelligence and Statistics (AISTATS)*, *PMLR*, 2024.
5. **Y. Liang** and V. V. Veeravalli, "Quickest Change Detection with Post-Change Density Estimation," in *IEEE Transactions on Information Theory*, 2024.
6. **Y. Liang** and V. V. Veeravalli, "Quickest Change Detection with Leave-One-Out Density Estimation," in *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 2023.
7. **Y. Liang**, A. G. Tartakovsky, and V. V. Veeravalli, "Quickest Change Detection with Non-stationary Post-change Observations," in *IEEE Transactions on Information Theory*, 2022.
8. **Y. Liang** and V. V. Veeravalli, "Non-Parametric Quickest Mean-Change Detection," in *IEEE Transactions on Information Theory*, 2022.
9. **Y. Liang** and 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.
10. **Y. Liang** and V. V. Veeravalli, "Non-Parametric Quickest Change Detection of a Change in the Mean of an Observation Sequence," in *Annual Conference on Information Sciences and Systems (CISS)*, 2021.

* Equal Contribution