Zhongchang Sun

PhD Candidate
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Research Interests

Machine learning, deep learning, reinforcement learning, sequential decision-making, casual inference and distributionally robust optimization.

Education

- Ph.D. in Electrical Engineering
  University at Buffalo, Buffalo, USA — Aug. 2019 - May 2024 (expected)
  Advisor: Prof. Shaofeng Zou
- B.S. in Electronic Information Engineering
  Beijing Institute of Technology, Beijing, China — Sept. 2015 - June 2019

Working Experiences

- AI Research Summer Associate, **JPMorgan Chase&Co**. — Jun. 2023 - Sept.2023
  - Study the neural Stochastic Differential Equations (SDEs) for time series generation
  - Design algorithms to jointly detect the change and train the neural SDEs based on GANs and VAEs
  - Conduct experiments on synthetic data and real data using Pytorch
  - Apply designed algorithms to business use cases, e.g., historical market data generation for trading policy evaluation

Research Project

- **Offline Robust Reinforcement Learning** — Mar. 2023 - Jan. 2024
  - Propose a unified framework for offline robust reinforcement learning
  - Design a novel uncertainty set to tackle the model mismatch and inaccurate model estimation in offline robust RL
  - Characterize the sample complexity of the proposed algorithm
  - Submit a paper to ICML 2024
- **Constrained Reinforcement Learning under Model Mismatch** — Mar. 2023 - Jan. 2024
  - Formulate the problem of constrained reinforcement learning
  - Develop a trust region-based policy optimization algorithm, and theoretically bound the constraint violation and performance improvement

  - Incorporate our algorithm into deep neural networks for tackling continuous control tasks
  - Submit a paper to ICML 2024

- **Quickest Change Detection over Networks with Unlabeled Samples** Sept. 2019 - Dec. 2020
  - Design an optimal algorithm for quickest change detection in heterogeneous sensor networks with unlabeled samples
  - Propose a computationally efficient alternative algorithm and characterize its performance
  - Evaluate the performance of proposed algorithms using Python

- **Data-Driven Robust Hypothesis Testing** Aug. 2020 - Mar. 2023
  - Propose a novel data-driven framework based on kernel MMD to model the uncertainty of true distributions
  - Design robust algorithms for hypothesis testing under Neyman-Pearson setting and Bayesian setting and characterize their performance
  - Evaluate the performance of proposed algorithms using synthetic data and real data

- **Quickest Fault Detection for Autoregressive Models** Dec. 2021 - Aug. 2022
  - Design an optimal algorithm for quickest fault detection in autoregressvie model
  - Evaluate the performance of proposed algorithm using real data in power system

- **Data-Driven Quickest Change Detection in Markov Models** Mar. 2022 - Oct. 2023
  - Propose a data-driven framework to detect the change in transition kernel of Markov chains
  - Design a novel kernel-based algorithm and characterize the performance
  - Evaluate the performance of proposed algorithm using synthetic data and microgrid data

Publications

Journal Papers and Preprints

[1] A. Magesh, **Z. Sun**, V. V. Veeravalli, S. Zou, "Robust Multi-Hypothesis Testing with Moment-Constrained Uncertainty Sets," *submitted to IEEE Transactions on Information Theory*, Jan. 2024.

[2] Q. Zhang, **Z. Sun**, L. Herrera, S. Zou, "Data-Driven Quickest Change Detection in (Hidden) Markov Models," *submitted to IEEE Transactions on Signal Processing*, Oct. 2023.

[3] **Z. Sun**, S. Zou. "Quickest Change Detection in Autoregressive Models," *submitted to IEEE Transactions on Information Theory*, accepted.

[4] **Z. Sun**, S. Zou. "Kernel Robust Hypothesis Testing," *IEEE Transactions on Information Theory*, Apr. 2023.

[5] **Z. Sun**, S. Zou. "Quickest Anomaly Detection in Sensor Networks With Unlabeled Samples," *IEEE Transactions on Signal Processing*, vol. 71, pp. 873-887, 2023.

[6] **Z. Sun**, S. Zou, R. Zhang, Q. Li. "Quickest Change Detection in Anonymous Heterogeneous Sensor Networks," *IEEE Transactions on Signal Processing*, vol. 70, pp. 1041–1055, 2022.

Conference Papers

[1] **Z. Sun**, Y. El-Laham, S. Vyetrenko, "Neural Stochastic Differential Equations with Change Points: A Generative Adversarial Approach," in *Proc. IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 2024.

[2] Q. Zhang, **Z. Sun**, L. Herrera, S. Zou, "Data-Driven Quickest Change Detection in Hidden Markov Models," in *Proc. IEEE International Symposium on Information Theory (ISIT)*, Jun. 2023.

[3] Q. Zhang, **Z. Sun**, L. Herrera, S. Zou, "Data-Driven Quickest Change Detection in Markov Models," in *Proc. IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, Jun. 2023.

[4] A. Magesh*, **Z. Sun***, V. Veeravalli, S. Zou, "Robust Hypothesis Testing with Moment Constrained Uncertainty Sets," in *Proc. IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, Jun. 2023 (*Equal Contribution).

[5] **Z. Sun**, S. Zou, "Robust Hypothesis Testing With Kernel Uncertainty Sets," in *Proc. IEEE International Symposium on Information Theory (ISIT)*, Jun. 2022.

[6] **Z. Sun**, S. Zou, "A Data-Driven Approach to Robust Hypothesis Testing Using Kernel MMD Uncertainty Sets," in *Proc. IEEE International Symposium on Information Theory (ISIT)*, Jul. 2021.

[7] **Z. Sun**, S. Zou, "Quickest Dynamic Anomaly Detection in Anonymous Heterogeneous Sensor Networks," in *Proc. IEEE International Symposium on Information Theory (ISIT)*, Jul. 2021.

[8] **Z. Sun**, Q. Li, R. Zhang, S. Zou, "A Computationally Efficient Algorithm for Quickest Change Detection in Anonymous Heterogeneous Sensor Networks," in *Proc. IEEE International Symposium on Information Theory (ISIT)*, Jul. 2021.

[9] **Z. Sun**, S. Zou, Q. Li, "Quickest Change Detection in Anonymous Heterogeneous Sensor Networks", in *Proc. IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, May 2020.

Teaching Experience

- EE 305: Applied Probability 2019 Fall
- EE 202: Circuit Analysis 2020 Fall
- EE 379: Embedded System and Application 2020 Spring, 2021 Spring

Reviewer

- IEEE International Symposium on Information Theory (ISIT)
- IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)
- IEEE Transactions on Information Theory
- IEEE Transactions on Signal Processing
- IEEE Transactions on Communications
- IEEE Transactions on Signal and Information Processing over Networks