Runyu (Cathy) Zhang

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RESEARCH INTEREST

My research interest lies in learning, control and decision making in large scale multi-agent infrastructures, with particular applications to dynamic network congestion problem as well as energy efficient building thermal control design. The high-level objective is to design rigorous and practical algorithms with theoretical guarantees for coordinating multi-agent systems that achieve good performance in a computationally and communicationally efficient manner. As an ultimate goal, my research is dedicated to providing both theoretical insights and engineering tools for AI-enabled multi-agent societal systems design and operation. My research is closely related to reinforcement learning (RL), game theory, control theory and optimization.

EDUCATION

Harvard University, Cambridge, MA, *September 2019 – May 2024 (expected)*
Ph.D. in Applied Mathematics
John A. Paulson School of Engineering and Applied Sciences
Committee: Profs. Na Li (Advisor), David Parkes, Lucas Janson, Eli Tziperman

Peking University, Beijing, China, *September 2015 – May 2019*
Bachelor of Science
School of Mathematical Sciences
Department of Scientific and Engineering Computing

OTHER ACADEMIC EXPERIENCE

University of California, Los Angeles, *June 2018 – September 2018*
Summer Research Internship
Advisor: Deanna Needell

AWARDS AND HONORS

Certificates of Distinction and Excellence in Teaching (Fall 2020), Derek Bok Center for Teaching and Learning, Harvard University

Being Selected to the Elite Undergraduate Training Program of the School of Mathematical Sciences at Peking University

TEACHING EXPERIENCE

Teaching Assistant, ES155: Systems and Control (Harvard Fall 2020).

PUBLICATIONS

Preprints/Under Review

Runyu Zhang, Zhaolin Ren, Na Li, *"Gradient Play in Multi-Agent Markov Stochastic Games: Stationary Points, Convergence and Sample Complexity."* Submitted to Tenth International Conference on Learning Representations (ICLR 2022)

Conference Publications

Runyu Zhang, Yingying Li, Na Li, *"On the Regret Analysis of Online LQR Control with Predictions."* The American Control Conference (ACC), 2021.

Mengdi Gao, Jamie Haddock, Denali Molitor, Deanna Needell, Eli Sadovnik, Tyler Will, **Runyu Zhang**, *"Neural nonnegative matrix factorization for hierarchical multilayer topic modeling."* 2019 IEEE 8th International Workshop on Computational Advances in Multi-Sensor Adaptive Processing (CAMSAP)

Journal Publications

Yingying Li, Yujie Tang, **Runyu Zhang**, Na Li, *"Distributed Reinforcement Learning for Decentralized Linear Quadratic Control: A Derivative-Free Policy Optimization Approach."* Accepted by IEEE Transactions on Automatic Control (TAC), 2021.

PRESENTATIONS

Runyu Zhang (2021). "On the Regret Analysis of Online LQR Control with Predictions." Paper presented online at the American Control Conference (ACC), 2021.