Jeongyeol Kwon

Contact Information

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Employment

University of Wisconsin-Madison, WI, USA
Postdoctorate (*Host:* Robert Nowak) 2022 - present

Education

University of Texas at Austin, TX, USA
Ph.D. in Electrical and Computer Engineering 2017 - 2022

Seoul National University, Seoul, Korea
B.S. in Electrical Engineering 2016

Seoul Science High School, Seoul, Korea 2008

Research Interests

Reinforcement Learning, Statistical Learning, Large-Scale Optimization, Partially Observable Markov Decision Processes, Bilevel Optimization, Latent Variable Models, Multitask Learning, Information Theory, Stochastic Approximation, Nonconvex Optimization, Robust Statistics

Conference Proceedings

J. Kwon, Y. Efroni, S. Mannor, and C. Caramanis, "RL in Latent MDPs is Tractable: Online Guarantees via Off-Policy Evaluation," *Proceedings of 38th Neural Information Processing Systems (NeurIPS)*, 2024.

J. Kwon, D. Kwon and H. Lyu, "On the Complexity of First-Order Methods in Stochastic Bilevel Optimization," *Proceedings of 41st International Conference on Machine Learning (ICML)*, 2024.

J. Kwon, Y. Efroni, S. Mannor and C. Caramanis, "Prospective Side Information for Latent MDPs," *Proceedings of 41st International Conference on Machine Learning (ICML)*, 2024 (Spotlight, top 3.54%).

J. Kwon, D. Kwon, S. Wright and R. Nowak, "On Penalty-Methods for Nonconvex Bilevel Optimization and First-Order Stochastic Approximation," *Proceedings of 12th International Conference on Learning Representations (ICLR)*, 2024 (Spotlight, top 4.96%).

J. Kwon, D. Kwon, S. Wright and R. Nowak, "A Fully First-Order Method for Stochastic Bilevel Optimization," *Proceedings of 40th International Conference on Machine Learning (ICML)*, 2023 (Oral, top 2.37%).

J. Kwon, Y. Efroni, C. Caramanis and S. Mannor, "Reward-Mixing MDPs with Few Latent Contexts are Learnable," *Proceedings of 40th International Conference on Machine Learning (ICML)*, 2023.

H. Bai, G. Canal, X. Du, **J. Kwon**, R. Nowak and S. Li, "Feed Two Birds with One Scone: Exploiting Wild Data for Both Out-of-Distribution Generalization and Detection," *Proceedings of 40th International Conference on Machine Learning (ICML)*, 2023.

J. Kwon, Y. Efroni, C. Caramanis and S. Mannor, "Tractable Optimality in Episodic Latent MABs," *Proceedings of 36th Neural Information Processing Systems (NeurIPS)*, 2022.

J. Kwon, Y. Efroni, C. Caramanis and S. Mannor, "Coordinated Attacks against Contextual Bandits: Fundamental Limits and Defense Mechanisms," *Proceedings of 39th International Conference on Machine Learning (ICML)*, 2022.

J. Kwon, Y. Efroni, C. Caramanis and S. Mannor, "Reinforcement Learning in Reward-Mixing MDPs," *Proceedings of 35th Neural Information Processing Systems (NeurIPS)*, 2021.

J. Kwon, Y. Efroni, C. Caramanis and S. Mannor, "RL for Latent MDPs: Regret Guarantees and a Lower Bound," *Proceedings of 35th Neural Information Processing Systems (NeurIPS)*, 2021 (Spotlight, top 2.85%).

J. Kwon, N. Ho and C. Caramanis, "On the Minimax Optimality of the EM Algorithm for Two-Component Mixed Linear Regression," *Proceedings of 24th Artificial Intelligence and Statistics (AISTATS)*, 2021.

J. Kwon and C. Caramanis, "The EM Algorithm gives Sample Optimality for Learning Mixtures of Well-Seperated Gaussians," *Proceedings of 33rd Annual Conference on Learning Theory (COLT)*, 2020.

J. Kwon and C. Caramanis, "EM Converges for a Mixture of Many Linear Regressions," *Proceedings of 23rd Artificial Intelligence and Statistics (AISTATS)*, 2020.

J. Kwon*, Q. Wei*, C. Caramanis, Y. Chen, and D. Davis, "Global Convergence of the EM Algorithm for Mixtures of Two Component Linear Regression," *Proceedings of 32nd Annual Conference on Learning Theory (COLT)*, 2019. (*: Equal Contribution)

Journals

J. Kwon, Q. Wei, C. Caramanis, Y. Chen, D. Davis and N.Ho, "Global Optimality of the EM Algorithm for Mixtures of Two Linear Regression," *IEEE Transactions on Information Theory (T-IT)*, 2024.

J. Zhuo, **J. Kwon**, N. Ho and C. Caramanis, "On the Computational and Statistical Complexity of Over-Parameterized Matrix Sensing," *Journal of Machine Learning Research (JMLR)*, 2024.

Preprints/In Submission

W. Powell, **J. Kwon**, Q. Xie, and H. Lyu, "A Rate-Optimal Policy Gradient Method for Infinite-Horizon Average-Reward MDPs without Uniform Mixing," *working Paper*.

J. Kwon, L. Dotson, Y. Chen, and Q. Xie, "A Tale of Two-Timescale Linear Stochastic Approximation with Constant Step-Sizes and Markovian Noise," *working Paper*.

J. Kwon, L. Yang, R. Nowak and J. Hanna, "Future Prediction Can be a Strong Evidence of Good History Representation in Partially Observable Environments," *arXiv preprint arXiv:2402.07102 (2024)*.

J. Kwon and C. Caramanis, "MLE and EM for Well-Separated Mixtures: Minimax Rates," *under review at IEEE Transactions on Information Theory*.

Teaching Experience

Wisconsin Institute for Discovery, Madison, WI

Organizer, IFDS Special Interest Group: Lower Bounds for Non-Convex SGDs — Fall 2023

The University of Texas at Austin, Austin, TX

Instructor, Student Workshop: Sum-of-Squares and Learning Mixture Models — Spring 2021

Organizer, Student Seminar: Theory of Reinforcement Learning — Spring 2020

The University of Texas at Austin, Austin, TX

Teaching Assistant, EE 381V, Large Scale Optimization — Fall 2018

Teaching Assistant, EE 381V-SE, Introduction to Convex Optimization — Spring 2018

Seoul National University, Seoul, Korea

Teaching Assistant, Convex Optimization — Fall 2016

Talks

- (Planned) Invited Talk, "RL in Latent MDPs is Tractable: Online Guarantees via Off-Policy Evaluation", at INFORMS Annual Meeting, Seattle-Washington, 10/2024.
- Invited Talk, "On The Complexity of First-Order Methods for Stochastic Bilevel Optimization", at Modeling and Optimization: Theory and Applications (MOPTA), Bethlehem-Pennsylvania, 08/2024.
- Invited Speaker, "On First-Order Methods for Stochastic Bilevel Optimization", at International Symposium on Mathematical Programming (ISMP), Montreal, Canada, 07/2024.
- Invited Speaker, "RL in Latent MDPs: Online Guarantees via Off-Policy Evaluation", at Adaptive Learning Systems TTIC Summer Workshop, Toyota Technology Institute at Chicago (TTIC), Chicago-Illinois, 07/2024.
- Guest Lecturer, "Foundations of Real-World Reinforcement Learning", at Seoul National University (SNU), Seoul, Korea, 05/2024.
- Invited Talk, "Foundations of Real-World Reinforcement Learning", at Krafton Inc., Seoul, Korea, 05/2024.
- Special Seminar, "Foundations of Real-World Reinforcement Learning", at Korea Advanced Institute of Science and Technology (KAIST), Daejon, Korea, 05/2024.
- Special Seminar, "Foundations of Real-World Reinforcement Learning", at Pohang University of Science and Technology (POSTECH), Pohang, Korea, 05/2024.
- Invited Talk, "Foundations of Real-World Reinforcement Learning", at Korea Institute for Advanced Study (KIAS) AI Center, Seoul, Korea, 05/2024.
- Invited Talk, "Foundations of Real-World Reinforcement Learning", at AI-EDGE/SPARKS Monthly Seminar, Virtual, 04/2024.
- Talk, "On Penalty Methods for Bilevel Optimization", at INFORMS Optimization Society (IOS) Conference, Houston-Texas, 03/2024.
- Invited Talk, "A Fully-First Order Method for Stochastic Bilevel Optimization", at INFORMS Annual Meeting, Pheonix-Arizona, 10/2023.
- Invited Talk, "Reinforcement Learning in Latent Environments", at Korea Advanced Institute of Science and Technology (KAIST), Virtual, 03/2023.
- Invited Speaker, "Reinforcement Learning with Latent Contexts", at Workshop: *New Models in Online Decision Making for Real-World Applications,* Toyota Technology Institute at Chicago (TTIC), Chicago-Illinois, 07/2022.
- Invited Talk, "RL for Latent MDPs: Regret Guarantees and a Lower Bound," at RL Theory Seminar, Virtual, 05/2021.

Services

Conference Review: Program Committee at AAAI-25, Reviewer at NeurIPS'21-24, ICML'21-24, ICLR'22-24

Journal Review: IEEE Transactions on Information Theory, IEEE Signal Processing Magazine/Letters, Operations Research, Mathematics of Operations Research, INFORMS Journal on Computing, Journal of the Royal Statistical Society: Series B, Bernoulli, Journal of Machine Learning Research, IEEE Transactions on Neural Networks and Learning Systems, Transactions on Machine Learning Research

Session Chair in "Recent Advances in Bilevel Optimization" and "Exploring Frontiers of Bilevel Optimization and In-context Learning" at INFORMS Optimization Society (IOS) Conference

Organizer of SILO Seminar at University of Wisconsin-Madison 2023-2024

Work Experience

Alegion, Inc., Austin, Texas

Research Intern, Research Internship in Human-Interactive Annotation 2019.6 - 2019.8

Scientific Analog Inc., Seoul, Korea

R&D Engineer, Software Engineer for Mixed Circuit Simulator 2015.5 - 2016.6

Redduck Inc., Seoul, Korea

Programmer, Software Engineer for a FPS PC Game Client 2011.2 - 2013.12

Honors and Awards

Graduate Continuing Fellowship, University of Texas at Austin, 2021 - 2022

- One-year scholarship for academic achievement

Scholarship, The Kwanjeong Educational Foundation, 2017 - 2021

- Four-year scholarship for doctorate program

Presidential Scholarship for Undergraduate, Korea Student Aid Foundation 2008 - 2014

- Four-year scholarship for undergradute program

International Collegiate Programming Contest, Association for Computing Machinery 2010

- 6th Place in Daejon Region
- 2nd Place in Hanoi Region

Korea Olympiad in Informatics, Ministry of Science, ICT and Future Planning 2007

- Gold in Area of High School

Korea Physics Olympiad, The Korean Physical Society 2007

- Silver in Area of High School

References

Constantine Caramanis (Ph.D. Advisor), Professor in Electrical and Computer Engineering

- Affiliation: University of Texas at Austin
- Email: constantine@utexas.edu

Shie Mannor, Professor in Electrical Engineering

- Affiliation: Technion, NVIDIA
- Email: shie@ee.technion.ac.il

Robert Nowak, Keith and Jane Nosbusch Professor in Electrical and Computer Engineering

- Affiliation: University of Wisconsin-Madison
- Email: rdnowak@wisc.edu

Stephen Wright, George B. Dantzig Professor in Computer Science

- Affiliation: University of Wisconsin-Madison
- Email: swright@cs.wisc.edu