## Jeongyeol Kwon


Contact Information

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Education

**The University of Texas at Austin**, TX
Ph.D. in Electrical and Computer Engineering 2017.8 - present

**Seoul National University (SNU)**, Seoul, Korea
B.S. in Electrical Engineering 2008.3 - 2016.2

**Seoul Science High School**, Seoul, Korea
High school diploma with distinction in 2 years 2006.3 - 2008.2

Research Interests

Machine/Statistical Learning, Computational Learning Theory, Latent Variable Models, Reinforcement Learning, Partially Observable Environment, High-Dimensional Statistics, Robust Statistics, Stochastic Approximation, Large-Scale Optimization

Publications

**J. Kwon**, Y. Efroni, C. Caramanis, and S. Mannor, "RL for Latent MDPs: Regret Guarantees and a Lower Bound," *arXiv preprint arXiv:2102.04939 (2021).*

J. Zhuo, **J. Kwon**, N. Ho and C. Caramanis, "On the Computational and Statistical Complexity of Over-Parameterized Matrix Sensing," *arXiv preprint arXiv:2102.02756 (2021).*

**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.

Work in Progress

**J. Kwon** and C. Caramanis, "Maximum Likelihood Estimation and Expectation-Maximization for a Mixture of Log-Concave Densities with Separation," *Working Paper.*

Research Experience

**DICE (Decision, Information, and Communications Engineering)**, The University of Texas at Austin, TX

*Graduate Research Assistant* (Prof. Constantine Caramanis) 2018.1 - present

- Theoretical study on reinforcement learning in Markov decision processes with latent contexts
- Local analysis of the likelihood landscape and Expectation-Maximization for a general class of log-concave mixture models with separation
- Theoretical study on the low-rank matrix factorization in a rank over-specified case

- Study on the application of sum-of-squares (SoS) proofs to the meta-learning of mixed linear regressions
- Lead a reading group on the theory of Reinforcement Learning: algorithms and analysis for efficient exploration, stochastic approximation and practical approaches
- Tight analysis on the EM algorithm for a mixture of well-separated Gaussians and linear regressions
- Global analysis on the EM algorithm for a mixture of two linear regressions with a tight statistical guarantee in all SNR regimes
- Adversarial Examples: Empirical study on robustifying DNN classifier to malicious perturbation on test image with GANs

**PIL (Perceptron and Intelligence Laboratory**, Seoul National University
*Research Internship* (Prof. Jin Young Choi) 2016.7 - 2017.4

- Multi-camera multi-object tracking in computer vision with network-flow formulation
- Group study on first-order optimization methods

**Design Project for Electrical Engineering**, Seoul National University
*Course Project: Computer Vision* (Prof. Nam Ik Cho) 2014.8 - 2014.12

- Image-dehazing with prior knowledge on the natural scene

## Teaching Experience

**The University of Texas at Austin**, Austin, TX
*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

## Work Experience

**Alegion, Inc.**, Austin, Texas
*Research Intern*, Research Internship in Human-Interactive Annotation 2019.6 - 2019. 8

- Explore automated annotation algorithms/applications
- Study on image segmentation with classical computer vision algorithms
- Apply a deep-learning based human-interactive annotation tool on a real annotation task
- Development language: Python

**Scientific Analog Inc.**, Seoul, Korea
*R&D Engineer*, Software Engineer for Mixed Circuit Simulator 2015.5 - 2016. 6

- Develop core module: first-order difference equation (ODE) solver for analog circuit
- Applied model-order reduction technique for faster simulation speed
- Develop scheduler and processor for events in the circuit system in a time order
- Development language: C/C++, Python, Verilog

**Redduck Inc.**, Seoul, Korea

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

- Develop a First Person Shooting (FPS) PC game client with Unreal Engine 3
- Game performance profiling, Game-log data analysis, Manage game AI logic
- Development language: C/C++, Unreal Engine Script

## Technical Skills

- Specialty: Statistical Learning Theory, Optimization, Reinforcement Learning
- Computer Language: C/C++, Python, MATLAB, LaTeX

## Honors and Awards

**Supplemental Fellowship**, The Kwanjeong Educational Foundation, 2017 - 2021

- Four-year scholarship for doctorate program.

**President 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 Daejeon 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