Junhyung Lyle Kim

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Education

Rice University
Houston, TX

Ph.D. in Computer Science
Aug 2019 - Present

- Advisor: Prof. Anastasios Kyrillidis [website]
- Research interests: optimization; distributed optimization; quantum computing; machine learning

University of Chicago
Chicago, IL

B.A. in Mathematics; B.A. in Statistics
Jun 2017

- Advisor: Prof. Panos Toulis [website]; General Honors; Dean's List 2013-2017

Research Experience

Meta, Fundamental AI Research (FAIR)
New York, NY

Research Intern; Supervisor: Dr. Aaron Defazio [website]
May 2022 - Aug 2022

- Theory and application of adaptive stochastic gradient methods for deep learning

Rice University, Computer Science Department
Houston, TX

Ph.D. student working with Prof. Anastasios Kyrillidis
Aug 2019 - Present

- Active collaborations with Google (F. Pedregosa) and IBM (G. Kollias) on optimization and quantum computing
- Efficient quantum state tomography with non-convex and distributed optimization methods
- Accelerating proximal/implicit methods for robust and fast optimization

University of Chicago, Booth School of Business
Chicago, IL

Research Assistant to Profs. Panos Toulis and Sanjog Misra
Jun 2017 - Jul 2019

- Stochastic approximation for large-scale inverse reinforcement learning

University of Chicago, Statistics Department
Chicago, IL

Research Assistant to Prof. Mikael Kuusela; Supervisor: Prof. Michael L. Stein
Oct 2016 - Jun 2017

- Uncertainty quantification for high-energy physics unfolding problem; [code]; [documentation]

Publications

[1] **J. L. Kim**, G. Gidel, A. Kyrillidis, F. Pedregosa "Momentum extragradient is optimal for games with cross-shaped Jacobian spectrum"
Workshop on Optimization for Machine Learning, NeurIPS 2022

[2] **J. L. Kim**, M. T. Toghani, C. A. Uribe, A. Kyrillidis, "Local stochastic factored gradient descent for distributed quantum state tomography"
Control Systems Letters (L-CSS), IEEE 2022

[3] **J. L. Kim**, P. Toulis, A. Kyrillidis, "Convergence and stability of the stochastic proximal point algorithm with momentum"
Conference on Learning for Dynamics and Control (L4DC), PMLR 2022

[4] **J. L. Kim**, P. Toulis, A. Kyrillidis, "Acceleration and stability of the stochastic proximal point algorithm"
Workshop on Optimization for Machine Learning, NeurIPS 2021 (spotlight)

Papers Under Review

[1] **J. L. Kim**, G. Kollias, A. Kalev, K. X. Wei, A. Kyrillidis, "Fast quantum state reconstruction via accelerated non-convex programming"

Working Papers

[1] **J. L. Kim**, J. A. Lara Benitez, M. T. Toghani, C. Wolfe, Z. Zhang, A. Kyrillidis "Momentum-inspired low-rank coordinate descent for diagonally constrained SDPs"

[2] C. Wolfe, Q. Wang, **J. L. Kim**, A. Kyrillidis "Provably efficient lottery ticket discovery"

[3] **J. L. Kim**, S. Misra, P. Toulis, "Exact inference of large-scale inverse reinforcement learning with stochastic gradient descent"

Invited Talks

Local stochastic factored gradient descent for distributed quantum state tomography — *Cancún, Mexico*
IEEE Conference on Decision and Control (CDC) — *Dec 2022*

Convergence and stability of the stochastic proximal point algorithm with momentum — *Indianapolis, IN*
Optimization for Machine Learning, INFORMS — *Oct 2022*

Convergence and stability of the stochastic proximal point algorithm with momentum — *Bethlehem, PA*
International Conference on Continuous Optimization (ICCOPT) — *Jul 2022*

Fast quantum state reconstruction via accelerated non-convex programming — *Houston, TX*
Quantum Group Meeting Seminar, Rice University — *Jan 2022*

Acceleration and stability of the stochastic proximal point algorithm — *Virtual*
Workshop on Optimization for Machine Learning, NeurIPS — *Dec 2021*

Fast quantum state reconstruction via accelerated non-convex programming — *Anaheim, CA*
Optimization in Quantum Computing, INFORMS — *Oct 2021*

Honors & Awards

2022 Rice Engineering Alumni Graduate Student Travel Grant ($960)
2021 Rice Engineering Alumni Graduate Student Travel Grant ($1,900)

Service

Workshops ICML (2021): co-organizer for "Beyond first order methods in machine learning systems" [link]
Reviews AISTATS (2022–2023), CDC (2022), NECSYS (2022), TCNS (2022)

Mentorship

Undergraduate students

Co-advised with Prof. Anastasios Kyrillidis

- Rithik Jain (Rice University): sparse learning with hadamard product — *Mar 2021 - May 2022*
- Justin Lumpkin (U of Maryland): deep matrix factorization; Google/Rice REU 1st place — *May 2021 - Aug 2021*
- Cruz Barnum (Reed College): scalable streaming PCA; Google/Rice REU 2nd place — *May 2021 - Aug 2021*

Others

Software MiFGD (Python) [link], sgd (R package) [link], UndersmoothedUnfolding (C++) [link]
Programming Python, R, C++, Matlab, ROOT (CERN)
Language Korean (native), English (bilingual proficiency)
Leadership President, Rice University Computer Science Graduate Student Association (2022 - 2023)
President, UChicago Korean Undergraduate Maroon Association (2016 - 2017)

Professional Experience

Dimensional Fund Advisors — *Austin, TX*

Research Intern, Investment Analytics & Data Group — *Jun 2016 - Sep 2016*

- Automated checking system for security database; prototyping VBA tool for data comparison

Cook M&A Advisory Services *Chicago, IL*
Investment Banking Summer Analyst *Jun 2015 - Aug 2015*

- Data analysis for several buy-side projects; client document drafting

Freenters, Inc. *Chicago, IL*
Operations Intern *Aug 2014 - Jan 2015*

- VBA tool for automatically personalized email dispatching; logo/poster design (Adobe Illustrator)

Republic of Korea Special Warfare Training Group (SWTG) *Gyeonggi, South Korea*
Special Forces Sergeant / Aide-de-Camp to the Commander of SWTG *Jan 2012 - Oct 2013*

- Airborne training (certified paratrooper license #748-416); maritime infiltration training