

Junhyung Lyle Kim

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Education

Rice University

Ph.D. in Computer Science

Houston, TX

Aug 2019 - Present

- Advisors: Prof. Anastasios Kyrillidis (chair) [website]; Prof. César A. Uribe [website]
- Research interests: optimization; distributed optimization; quantum computing; machine learning

University of Chicago

B.A. in Mathematics; B.A. in Statistics

Chicago, IL

Jun 2017

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

Research Experience

Meta, Fundamental AI Research (FAIR)

Research Intern; Supervisor: Dr. Aaron Defazio [website]

New York, NY

May 2022 - Aug 2022

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

Rice University, Computer Science Department

Ph.D. student working with Prof. Anastasios Kyrillidis and Prof. César A. Uribe

Houston, TX

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

Research Assistant to Prof. Panos Toulis and Prof. Sanjog Misra

Chicago, IL

Jun 2017 - Jul 2019

- Stochastic approximation for large-scale inverse reinforcement learning

University of Chicago, Statistics Department

Research Assistant to Prof. Mikael Kuusela; Supervisor: Prof. Michael L. Stein

Chicago, IL

Oct 2016 - Jun 2017

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

Publications

Journal/Conference Papers

- [1] **J. L. Kim**, M. T. Toghiani, C. A. Uribe, A. Kyrillidis, "Local stochastic factored gradient descent for distributed quantum state tomography"
Control Systems Letters (L-CSS)/Conference on Decision and Control(CDC), IEEE 2022
- [2] **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

Workshop Papers & Posters

- [1] **J. L. Kim**, G. Kollias, A. Kalev, K. X. Wei, A. Kyrillidis, “Fast quantum state reconstruction via accelerated non-convex programming”
Quantum Information Processing (QIP), 2023
- [2] **J. L. Kim**, M. T. Toghiani, C. A. Uribe, A. Kyrillidis, “Local stochastic factored gradient descent for distributed quantum state tomography”
Quantum Information Processing (QIP), 2023
- [3] **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
- [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)

Working Papers

- [1] **J. L. Kim**, G. Gidel, A. Kyrillidis, F. Pedregosa “Polynomial-based analysis of the momentum extragradient method”
- [2] **J. L. Kim**, J. A. Lara Benitez, M. T. Toghiani, C. Wolfe, Z. Zhang, A. Kyrillidis “Momentum-inspired low-rank coordinate descent for diagonally constrained SDPs”
- [3] C. Wolfe, Q. Wang, **J. L. Kim**, A. Kyrillidis “Provably efficient lottery ticket discovery”

Invited Talks

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| Local stochastic factored gradient descent for distributed quantum state tomography <i>IEEE Conference on Decision and Control (CDC)</i> | Cancún, Mexico Dec 2022 |
| Convergence and stability of the stochastic proximal point algorithm with momentum <i>Optimization for Machine Learning, INFORMS</i> | Indianapolis, IN Oct 2022 |
| Convergence and stability of the stochastic proximal point algorithm with momentum <i>International Conference on Continuous Optimization (ICCOPT)</i> | Bethlehem, PA Jul 2022 |
| Fast quantum state reconstruction via accelerated non-convex programming <i>Quantum Group Meeting Seminar, Rice University</i> | Houston, TX Jan 2022 |
| Acceleration and stability of the stochastic proximal point algorithm <i>Workshop on Optimization for Machine Learning, NeurIPS</i> | Virtual Dec 2021 |
| Fast quantum state reconstruction via accelerated non-convex programming <i>Optimization in Quantum Computing, INFORMS</i> | Anaheim, CA Oct 2021 |

Honors & Awards

- 2022 Rice Engineering Alumni Graduate Student Fall Travel Grant (\$1,200)
- 2022 Rice Engineering Alumni Graduate Student Spring Travel Grant (\$960)
- 2021 Rice Engineering Alumni Graduate Student Fall 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

Research Intern, Investment Analytics & Data Group

Austin, TX

Jun 2016 - Sep 2016

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

Cook M&A Advisory Services

Investment Banking Summer Analyst

Chicago, IL

Jun 2015 - Aug 2015

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

Freenters, Inc.

Operations Intern

Chicago, IL

Aug 2014 - Jan 2015

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

Republic of Korea Special Warfare Training Group (SWTG)

Special Forces Sergeant / Aide-de-Camp to the Commander of SWTG

Gyeonggi, South Korea

Jan 2012 - Oct 2013

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