J. Lyle Kim

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Education

Rice University — *Houston, TX*
Ph.D. in Computer Science — *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 — *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

Mila – Quebec Artificial Intelligence Institute / Université de Montréal — *Montréal, QC*
Visiting Student Researcher; Hosts: Profs. Ioannis Mitliagkas and Gauthier Gidel — *May 2023 - Present*

- Analysis of single and multi-objective optimization with applications in machine learning

Meta, Fundamental AI Research (FAIR) — *New York, NY*
Research Intern; Host: 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 Profs. Anastasios Kyrillidis and César A. Uribe — *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

Journal/Conference Papers

[1] **J. L. Kim**, G. Kollias, A. Kalev, K.X. Wei, A. Kyrillidis. "Fast Quantum State Reconstruction via Accelerated Non-Convex Programming"
Photonics 2023 / Quantum Information Processing (QIP) 2023 (poster)

[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 / Quantum Information Processing (QIP) 2023 (poster)

[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

Workshop Papers

[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**, 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. Gidel, A. Kyrillidis, F. Pedregosa. "When is Momentum Extragradient Optimal? A Polynomial-Based Analysis"

Working Papers

[1] **J. L. Kim**, M. T. Toghani, C. A. Uribe, A. Kyrillidis. "Adaptive Federated Learning with Auto-Tuned Clients"

[2] **J. L. Kim**, N. Chia, A. Kyrillidis. "Solving Quantum Linear System via Implicit Gradient Descent"

[3] **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"

[4] C. Wolfe, Q. Wang, **J. L. Kim**, A. Kyrillidis. "Provably Efficient Lottery Ticket Discovery"

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

2023 AISTATS 2023 Top Reviewer (Top 10 %)
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 Programming: MiFGD (Python) [link], sgd (R package) [link], UndersmoothedUnfolding (C++) [link]
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