J. Lyle Kim

Legal name: Junhyung Kim

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Education

Rice University — Houston, TX
Ph.D. in Computer Science — Aug 2019 - Present

- Advisors: Profs. Anastasios Kyrillidis (chair) [website]; César A. Uribe [website]; Nai-Hui Chia [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

Rice University, Computer Science Department — Houston, TX
Ph.D. Candidate — Aug 2019 - Present

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

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

- Convergence analysis of structured performative prediction

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

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

[2] Local Stochastic Factored Gradient Descent for Distributed Quantum State Tomography
J. L. Kim, M. T. Toghani, C. A. Uribe, A. Kyrillidis.
Control Systems Letters (L-CSS), IEEE 2022 / Quantum Information Processing (QIP) 2023 (poster)

[3] Convergence and Stability of the Stochastic Proximal Point Algorithm with Momentum
J. L. Kim, P. Toulis, A. Kyrillidis.
Conference on Learning for Dynamics and Control (L4DC), PMLR 2022

Workshop Papers

[1] Adaptive Federated Learning with Auto-Tuned Clients via Local Smoothness
J. L. Kim, M. T. Toghani, C. A. Uribe, A. Kyrillidis.
Federated Learning and Analytics in Practice: Algorithms, Systems, Applications, and Opportunities, ICML 2023

[2] Momentum Extragradient Is Optimal for Games with Cross-Shaped Jacobian Spectrum
J. L. Kim, G. Gidel, A. Kyrillidis, F. Pedregosa.
Workshop on Optimization for Machine Learning, NeurIPS 2022

[3] Acceleration and Stability of the Stochastic Proximal Point Algorithm
J. L. Kim, P. Toulis, A. Kyrillidis.
Workshop on Optimization for Machine Learning, NeurIPS 2021 (spotlight)

Papers Under Review

[1] When is Momentum Extragradient Optimal? A Polynomial-Based Analysis
J. L. Kim, G. Gidel, A. Kyrillidis, F. Pedregosa.

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

[3] On the Error-Propagation of Inexact Deflation for Principal Component Analysis
F. Liao, **J. L. Kim**, C. Barnum, A. Kyrillidis.

[4] How Much Pre-training Is Enough to Discover a Good Subnetwork?
C. Wolfe, F. Liao, Q. Wang, **J. L. Kim**, A. Kyrillidis.

Working Papers

[1] Solving Quantum Linear System Problem via Implicit Gradient Descent
J. L. Kim, N. H. Chia, A. Kyrillidis.

[2] First-Order Method for Variational Inequality Problems in Function Space
R. D'Orazio, **J. L. Kim**, I. Mitliagkas.

[3] Performative Prediction with Regularization
M. Mofakhami, **J. L. Kim**, I. Mitliagkas, G. Gidel

Invited Talks

Adaptive Federated Learning with Auto-Tuned Clients — Phoenix, AZ
Annual Meeting, INFORMS — Oct 2023

Adaptive Federated Learning with Auto-Tuned Clients — Montréal, Canada
Montréal Machine Learning and Optimization (MTL MLOpt), MILA — Jun 2023

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 Rice Engineering Alumni Graduate Student Fall Travel Grant ($480)
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 QuantIPS 2023: Co-organizer for "Quantum Information Processing Systems" [link]
TL;DR 2023: Co-organizer for "Texas Colloquium on Distributed Learning" [link]
ICML (2021): Co-organizer for "Beyond first order methods in machine learning systems" [link]
Reviews AISTATS (2022–2023), NeurIPS (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