J. Lyle 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. 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
- 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] 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
J. L. Kim, M. Mofakhami, I. Mitliagkas, G. Gidel

[4] Error-Bounded Deflation in Stochastic PCA
C. Barnum, F. Liao, **J. L. Kim**, A. Kyrillidis.

Invited Talks

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   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