Sarit Khirirat

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Birthdate: 2/May/1991
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https://scholar.google.se/citations?hl=enuser=NSFBRNAAAAAJ

Qualifications

- Strong research background in **numerical optimization**, **machine learning** and **federated learning**.
- Author of publications at machine learning and signal processing conferences (i.e. **NeurIPS**, **AAAI**, **ICASSP**).
- Proficiency in programming languages such as **Python, Julia, MATLAB/Simulink, CVX, LaTeX** and **Git**.

Education

KTH Royal Institute of Technology — Stockholm, Sweden
Ph.D., Electrical Engineering and Computer Science — 2016 – 2022
Advisor: Prof. Mikael Johansson
Thesis: First-order algorithms for communication efficient distributed learning

KTH Royal Institute of Technology — Stockholm, Sweden
M.Sc., Systems, Control, and Robotics, GPA: 3.5/4.0 — 2014 – 2016
Advisor: Prof. Mikael Johansson
Thesis: Randomized first-order methods for convex optimization

Chulalongkorn University — Bangkok, Thailand
B.Eng. (First Class Honors), Electrical Engineering, GPA: 3.83/4.0 — 2009 – 2013
Advisor: Assoc. Prof. Watcharapong Khovidhungij
Thesis: Application of adaptive backstepping design for uncertain linear systems with unknown input time-delay

Research and Industry Experience

Mohamed bin Zayed University of Artificial Intelligence — Abu Dhabi, UAE
Postdoctoral Fellow *advised by Prof. Peter Richtárik* — 2022 – present

- Developed federated learning algorithms with provable statistical optimality and differential privacy

KTH Royal Institute of Technology — Stockholm, Sweden
PhD Researcher *supervised by Prof. Mikael Johansson* — 2016 – 2022

- Developed an adaptive communication-aware framework that optimizes online communication efficiency
- Proposed compensation algorithms that use low-precision information but guarantee high solution accuracy
- Provided a unified framework for analyzing communication efficient optimization methods
- Collaborated with leading scholars from Stockholm University and IST Austria

Yokogawa, Thailand, Ltd. — Bangkok, Thailand
Summer Intern — 2012

- Implemented distributed control and automation systems for chemical processes
- Programmed with Centum-VP software, PLC, SCADA and AutoCAD

Teaching Experience

KTH Royal Institute of Technology — Stockholm, Sweden
Teaching Assistant*, EL1010: Automatic Control, General Course* — 2017-2018, 2020

- Prepared online video lessons, course materials and course web pages with Pandoc and Descript
- Led weekly exercise and laboratory sessions for a group of 20-30 students
- Designed and graded final exams

KTH Royal Institute of Technology Stockholm, Sweden
***Bachelor's Thesis Supervisor**, EL111X: Degree Project in Electrical Engineering, First Cycle* 2017, 2019-2020

- Organized basic tutorials on convex optimization and CVX
- Advised projects on autonomous vehicles, portfolio optimization and stock market prediction systems

Chulalongkorn University Bangkok, Thailand
***Teaching Staff**, Fundamental Engineering Camp (FECamp)* 2010

- Taught introductory courses of University Calculus and Physics for more than 50 students

Awards

Rising Star in AI (ranked among top 20%) 2023
in *the KAUST AI Initiative*
headed by **Prof. Jürgen Schmidhuber**

Best Student Paper Award 2019
in *the 44^{th} International Conference on Acoustics, Speech and Signal Processing*
sponsored by **Hitachi**

Academic PhD Position 2018 – 2022
in the cluster of *Large Scale Optimization and Control*
funded by **the Wallenberg AI, Autonomous Systems and Software program**

Publications

[S1] Improved Step-Size Schedules for Proximal Noisy Gradient Methods
S. Khirirat, X. Wang, S. Magnússon, M. Johansson
IEEE Transactions on Signal Processing, 2023 (Accepted)

[S2] Improved Step-Size Schedules for Noisy Gradient Methods
S. Khirirat, X. Wang, S. Magnússon, M. Johansson
IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), 2021

[S3] A Flexible Framework for Communication-Efficient Machine Learning
S. Khirirat, S. Magnússon, A. Aytekin, M. Johansson
Proceedings of the AAAI Conference on Artificial Intelligence, 2021

[S4] Compressed Gradient Methods for Hessian-Aided Error Compensation
S. Khirirat, S. Magnússon, M. Johansson
IEEE Transactions on Signal Processing, 2020

[S5] Convergence Bounds for Compressed Gradient Methods with Memory Based Error Compensation (Best Student Paper Award)
S. Khirirat, S. Magnússon, M. Johansson
IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), 2019

[S6] The Convergence of Sparsified Gradient Methods
D. Alistarh, T. Hoefler, M. Johansson, N. Konstantinov, **S. Khirirat**, C. Renggli
Advances in Neural Information Processing Systems (NeurIPS), 2018

[S7] Gradiet Compression for Communication-Limited Convex Optimization
S. Khirirat, M. Johansson, D. Alistarh
IEEE Conference on Decision and Control (CDC), 2018

[S8] Mini-batch Gradient Descent: Faster Convergence under Data Sparsity
S. Khirirat, H.R.Feyzmahdavian, M. Johansson
IEEE Conference on Decision and Control (CDC), 2017

Scientific and outreach activities

Reviewer for the following conferences and journals 2019-2022

- *Conference on Neural Information Processing Systems*; *AAAI Conference on Artificial Intelligence*; *International Conference on Learning Representations (ICLR)*; *IMA Journal of Applied Mathematics*; *IEEE Transactions on Signal Processing*; *Automatica*; *Systems & Control Letters*; *IEEE Conference on Decision and Control (CDC); IEEE American Control Conference (ACC)*; *European Control Conference (ECC)*

Presenter, Seminar Talk: "A Flexible Framework for Communication-Efficient Machine Learning" 2021

- **Federated Learning One World Seminar (FLOW)**

Presenter, Seminar Talk: "First-Order Methods for Communication-Efficient Machine Learning" 2021

- **Harvard University**, School of Engineering and Applied Sciences (SEAS)

Staff, Chula Academic Expo, Chulalongkorn University 2012

- Staffed and presented a research poster on Thai dictionary for deaf mutes to the public