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Lukang Sun

Research Interest

My previous and ongoing research revolves around the analysis and improvement of algorithms originating from the fields of optimization, statistics, and machine learning. More specifically, I have focused on analyzing and improve sampling algorithms such as Stein Variational Gradient Descent (SVGD) and Langevin-type algorithms. Additionally, I have explored optimization algorithms, including Stochastic Gradient Descent and zeroth-order Consensus-Based Optimization methods. Nevertheless, my research interests are beyond the aforementioned areas. I aspire to broaden my research horizons by exploring general problems that encompass intriguing physics, challenging mathematics, and possess significant practical applications.

Education

King Abdullah University of Science and Technology — Thuwal, Saudi Arabia
Ph.D. in Computer Science — 2021–Current

Nanjing University — Nanjing, China
M.S. in Pure Mathematics — 2017–2020

- Thesis: "Harmonic functions on RCD(K,N) spaces"

Jilin University — Changchun, China
B.S. in Mathematics and Applied Mathematics — 2013–2017

Publications

Journal, Conference and Workshop

1. A. Salim, L. Sun, and P. Richtárik "A Convergence Theory for SVGD in the Population Limit under Talagrand's Inequality T1", ***International Conference on Machine Learning**, 2022*
2. L. Sun, K. Avetik and P. Richtárik "Convergence of Stein variational gradient descent under a weaker smoothness condition", ***International Conference on Artificial Intelligence and Statistics**, 2023*
3. A. Tyurin, L. Sun, B. Konstatin and P. Richtárik "Sharper Rates and Flexible Framework for Nonconvex SGD with Client and Data Sampling", ***Transactions on Machine Learning Research**, 2023*
4. L. Sun and P. Richtárik "Improved Stein Variational Gradient Descent with Importance Weights", ***NeurIPS Optimal Transport and Machine Learning Workshop**, 2023*

Preprints

1. M. Fornasier, P. Richtárik, K. Riedl and L. Sun "Consensus-Based Optimization with Truncated Noise", ***submitted to European Journal of Applied Mathematics***
2. L. Sun, A. Salim and P. Richtárik "Federated Learning with a Sampling Algorithm under Isoperimetry",***arXiv preprint arXiv:2206.00920***
3. L. Sun and P. Richtárik "A Note on the Convergence of Mirrored Stein Variational Gradient Descent under $(L_0, L_1)-$ Smoothness Condition",***arXiv preprint arXiv:2206.09709***

Experience

Technical University of Munich — Munich, German
Visited Professor Massimo Fornasier — June 19th 2023 –July 2nd 2023

Georgia Institute of Technology — Atlanta, US
Exchange student/School of Mathematics — Jan 2016 –May 2016

The Hong Kong University of Science and Technology — Hong Kong, China
Visiting student/Mathematics department — One week, Dec 2015

Teaching

- **Teaching Assistant** at Nanjing University — Fall 2016
  Advanced Mathematics
- **Teaching Assistant** at Nanjing University — Spring 2016
  Calculus

Skills

- **Coding Language:** Latex, Matlab and Python
- **Mathematical Analysis:** Optimal Transport, Stochastic Calculus

Scholarships and Awards

- KAUST Dean's List Award — 2023

Referees

- **Prof. Dr. Peter Richtárik (Advisor)**, Professor of Computer Science, King Abdullah University of Science and Technology (KAUST). Address: Office 3145, Bldg 12, 4700 KAUST, Thuwal 23955-6900, Saudi Arabia. Email: peter.richtarik@kaust.edu.sa
- **Prof. Dr. Massimo Fornasier**, Chair of Applied Numerical Analysis, Technical University of Munich (TUM). Address: Room 5610.02.058, Boltzmannstr. 3, 85748 Garching b. München, German. Email: massimo.fornasier@ma.tum.de