Zhize LI

School of Computing and Information Systems
Singapore Management University (SMU)
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Education

PhD, Tsinghua University, China, 2019

Bachelor of Engineering, Xidian University, China, 2014
GPA Ranking: 2/419

Academic Appointments

Assistant Professor of Computer Science, School of Computing and Information Systems, SMU, Nov 2023 - Present

Research Scientist, Carnegie Mellon University, United States of America, Mar 2022 - Oct 2023

Research Scientist, King Abdullah University of Science and Technology, Saudi Arabia, Sep 2020 - Mar 2022

Postdoctoral Research Fellow, King Abdullah University of Science and Technology, Saudi Arabia, Sep 2019 - Sep 2020

Visiting Scholar, Georgia Institute of Technology, United States of America, Jun 2018 - Jul 2018

Visiting Scholar, Duke University, United States of America, Jan 2018 - Sep 2018

Awards and Honors

Invited Lecturer for Theoretical Computer Science Summer School, Nanjing University, 2024

Invited Speaker, The 10th China Conference on Data Mining, 2024

Tutorial, The 48th IEEE International Conference on Acoustics, Speech, and Signal Processing, 2023

Rising Star in AI, King Abdullah University of Science and Technology, 2022

Tsinghua Outstanding Doctoral Dissertation Award (3 awardees in the entire institute), Tsinghua University, 2019

Distinguished Outstanding Graduate (Highest Honor, Top 1%), Xidian University, 2014

National Scholarship (Top 1%), Ministry of Education of the People's Republic of China, 2012

RESEARCH

Research Interests

Optimization and Machine Learning,
Large-scale/Distributed/Decentralized Optimization,
Private/Efficient/Resilient Federated Learning

Publications

Journal Articles [Refereed]

EF21 with bells & whistles: Six algorithmic extensions of modern error feedback, by FATKHULLIN, Ilyas; SOKOLOV, Igor; GORBUNOV, Eduard; LI, Zhize; RICHTARIK, Peter. (2025). *Journal of Machine Learning Research, 26* (189), 1-50. (Published)

The effectiveness of local updates for decentralized learning under data heterogeneity, by WU, Tongle; LI, Zhize; SUN, Ying. (2025). *IEEE Transactions on Signal Processing, 73* 751-765. https://doi.org/10.1109/TSP.2025.3533208 (Published)

Faster rates for compressed federated learning with client-variance reduction, by ZHAO, Haoyu; BURLACHENKO, Konstantin; LI, Zhize; RICHTARIK, Peter. (2024). *SIAM Journal on Mathematics of Data Science, 6* (1), 154-175. https://doi.org/10.1137/23M1553820 (Published)

DESTRESS: Computation-optimal and communication-efficient decentralized nonconvex finite-sum optimization, by LI, Boyue; LI, Zhize; CHI, Yuejie. (2022). *SIAM Journal on Mathematics of Data Science, 4* (3), 1031-1051. https://doi.org/10.1137/21M1450677 (Published)

Simple and optimal stochastic gradient methods for nonsmooth nonconvex optimization, by LI, Zhize; LI, Jian. (2022). *Journal of Machine Learning Research, 23* (1), 10891-10951. https://doi.org/10.5555/3586589.3586828 (Published)

Optimal in-place suffix sorting, by LI, Zhize; LI, Jian; HUO, Hongwei. (2022). *Information and Computation, 285* 1-25. https://doi.org/10.1016/j.ic.2021.104818 (Published)

Stochastic gradient Hamiltonian Monte Carlo with variance reduction for Bayesian inference, by LI, Zhize; ZHANG, Tianyi; CHENG, Shuyu; ZHU, Jun; LI, Jian. (2019). *Machine Learning, 108* (8-9), 1701-1727. https://doi.org/10.1007/s10994-019-05825-y (Published)

Conference Proceedings

EFSkip: A new error feedback with linear speedup for compressed federated learning with arbitrary data heterogeneity, by BAO, Hongyan; CHEN, Pengwen; SUN, Ying; LI, Zhize. (2025.0). *Proceedings of the 39th Conference on Neural Information Processing Systems (NeurIPS 2025), San Diego, CA, December 2-7* , (pp. 15489-15497) Philadelphia, Pennsylvania, USA: AAAI. https://doi.org/10.1609/aaai.v39i15.33700 (Published)

Coresets for clustering under stochastic noise, by HUANG, Lingxiao; LI, Zhize; VISHNOI, Nisheeth K.; YANG, Runkai; ZHAO, Haoyu. (2025.0). *Proceedings of the 39th Conference on Neural Information Processing Systems (NeurIPS 2025), San Diego, CA, December 2-7,* (pp. 1-50) San Diego, USA: https://arxiv.org/pdf/2510.23438 (Published)

SIFAR: A simple faster accelerated variancereduced gradient method, by LI, Zhize. (2025.0). *IJCAI '25: Proceedings of the Thirty-Fourth International Joint Conference on Artificial Intelligence, Montreal, Canada, August 16-22,* (pp. 5662-5670) New York : ACM. https://doi.org/10.24963/ijcai.2025/630 (Published)

From risk to resilience: Towards assessing and mitigating the risk of data reconstruction attacks in federated learning, by XU, Xiangrui; LI, Zhize; HAN, Yufei; WANG, Bin; LIU, Jiqiang; WANG, Wei. (2025.0). *SEC '25: Proceedings of the 34th USENIX Conference on Security Symposium, Seattle, USA, August 13-15,* (pp. 3141-3160) Seattle, USA: https://www.usenix.org/system/files/usenixsecurity25-xu-xiangrui.pdf (Published)

Escaping saddle points in heterogeneous federated learning via distributed SGD with communication compression, by CHEN, Sijin; LI, Zhize; CHI, Yuejie. (2024.0). *Proceedings of the 27th International*

Conference on Artificial Intelligence and Statistics (AISTATS 2024) : May 2-4, Valencia, Spain, (pp. 1-26) Valencia: Proceedings of Machine Learning Research. (Published)

SoteriaFL: A unified framework for private federated learning with communication compression, by LI, Zhize; ZHAO, Haoyu; LI, Boyue; CHI, Yuejie. (2022.0). *Proceedings of the 36th Conference on Neural Information Processing Systems (NeurIPS 2022), Hybrid Conference, November 28 - December 9,* (pp. 1-39) New Orleans, USA: Neural Information Processing Systems Foundation. https://proceedings.neurips.cc/paper_files/paper/2022/hash/1b645a77cf48821afc3ee7e5b5d42617-Abstract-Conference.html (Published)

Coresets for vertical federated learning: Regularized linear regression and k-means clustering, by HUANG, Lingxiao; LI, Zhize; SUN, Jialin; ZHAO, Haoyu. (2022.0). *Proceedings of the 36th Conference on Neural Information Processing Systems (NeurIPS 2022), Hybrid Conference, November 28 - December 9,* (pp. 1-32) New Orleans, USA: Neural Information Processing Systems Foundation. https://proceedings.neurips.cc/paper_files/paper/2022/hash/be7b70477c8fca697f14b1dbb1c086d1-Abstract-Conference.html (Published)

BEER: Fast O(1/T) rate for decentralized nonconvex optimization with communication compression, by ZHAO, Haoyu; LI, Boyue; LI, Zhize; RICHTARIK, Peter; CHI, Yuejie. (2022.0). *Proceedings of the 36th Conference on Neural Information Processing Systems (NeurIPS 2022), Hybrid Conference, November 28 - December 9,* (pp. 1-26) New Orleans, USA: Neural Information Processing Systems Foundation. https://proceedings.neurips.cc/paper_files/paper/2022/hash/cd86c6a804d925c4cbc5a7b96843f6d5-Abstract-Conference.html (Published)

3PC: Three point compressors for communication-efficient distributed training and a better theory for lazy aggregation, by RICHTARIK, Peter; SOKOLOV, Igor; FATKHULLIN, Ilyas; GASANOV, Elnur; LI, Zhize; GORBUNOV, Eduard. (2022.0). *Proceedings of the 39th International Conference on Machine Learning (ICML 2022), Maryland, USA, July 17-23* , (pp. 1-53) Maryland, USA: Proceedings of Machine Learning Research. https://proceedings.mlr.press/v162/richtarik22a.html (Published)

CANITA: Faster rates for distributed convex optimization with communication compression, by LI, Zhize; RICHTARIK, Peter. (2021.0). *Proceedings of the 35th Conference on Neural Information Processing Systems (NeurIPS 2021), Sydney, Australia, December 6-14,* (pp. 1-21) Virtual Conference: Neural Information Processing Systems Foundation. https://proceedings.neurips.cc/paper_files/paper/2021/hash/7274a60c83145b1082be9caa91926ecf-Abstract.html (Published)

MARINA: Faster non-convex distributed learning with compression, by GORBUNOV, Eduard; BURLACHENKO, Konstantin; LI, Zhize; RICHTARIK, Peter. (2021.0). *Proceedings of the 38th International Conference on Machine Learning (ICML 2021), Virtual Conference, July 18-24,* (pp. 1-41) Virtual: Proceedings of Machine Learning Research. https://proceedings.mlr.press/v139/gorbunov21a (Published)

PAGE: A simple and optimal probabilistic gradient estimator for nonconvex optimization, by LI, Zhize; BAO, Hongyan; ZHANG, Xiangliang; RICHTARIK, Peter. (2021.0). *Proceedings of the 38th International Conference on Machine Learning (ICML 2021), Virtual Conference, July 18-24,* (pp. 1-25) Virtual Conference: Proceedings of Machine Learning Research. https://proceedings.mlr.press/v139/li21a.html (Published)

A fast Anderson-Chebyshev acceleration for nonlinear optimization, by LI, Zhize; LI, Jian. (2020.0). *Proceedings of the 23rd International Conference on Artificial Intelligence and Statistics (AISTATS 2020), Virtual Conference, August 26-28,* (pp. 1-17) Virtual Conference: Proceedings of Machine Learning Research. https://proceedings.mlr.press/v108/li20d.html (Published)

Acceleration for compressed gradient descent in distributed and federated optimization, by LI, Zhize; KOVALEV, Dmitry; QIAN, Xun; RICHTARIK, Peter. (2020.0). *Proceedings of the 37th International Conference on Machine Learning (ICML 2020), Virtual Conference, July 13-18,* (pp. 1-23) Virtual Conference: Proceedings of Machine Learning Research. https://proceedings.mlr.press/v119/li20g.html (Published)

A unified variance-reduced accelerated gradient method for convex optimization, by LAN, Guanghui; LI, Zhize; ZHOU, Yi. (2019.0). *Proceedings of the 33rd Conference on Neural Information Processing Systems (NeurIPS 2019), Vancouver, Canada, December 8-14,* (pp. 1-24) Vancouver, Canada: Neural Information Processing Systems Foundation. https://arxiv.org/pdf/1905.12412.pdf (Published)

SSRGD: Simple Stochastic Recursive Gradient Descent for escaping saddle points, by LI, Zhize. (2019.0).

Proceedings of the 33rd Conference on Neural Information Processing Systems (NeurIPS 2019), Vancouver, Canada, December 8-14 , (pp. 1-11) Vancouver, Canada: Neural Information Processing Systems Foundation. https://arxiv.org/abs/1904.09265 (Published)

Gradient boosting with piece-wise linear regression trees, by SHI, Yu; LI, Jian; LI, Zhize. (2019.0). *Proceedings of the 28th International Joint Conference on Artificial Intelligence (IJCAI 2019), Macao, August 10-16,* (pp. 1-9) Macao, China: International Joint Conferences on Artificial Intelligence. https://arxiv.org/abs/1802.05640 (Published)

Stabilized SVRG: Simple Variance Reduction for Nonconvex Optimization, by GE, Rong; LI, Zhize; WANG, Weiyao; WANG, Xiang. (2019.0). *Proceedings of the 32nd Conference on Learning Theory (COLT 2019), Phoenix, USA, June 25-28,* (pp. 1394-1448) Phoenix, USA: Proceedings of Machine Learning Research. https://proceedings.mlr.press/v99/ge19a (Published)

Learning two-layer neural networks with symmetric inputs, by GE, Rong; KUDITIPUDI, Rohith; LI, Zhize; WANG, Xiang. (2019.0). *Proceedings of the 7th International Conference on Learning Representations (ICLR 2019), New Orleans, Louisiana, May 6-9,* (pp. 1-53) New Orleans, USA: International Conference on Learning Representations. https://arxiv.org/abs/1810.06793 (Published)

A simple proximal stochastic gradient method for nonsmooth nonconvex optimization, by LI, Zhize; LI, Jian. (2018.0). *Proceedings of the 32nd Conference on Neural Information Processing Systems (NeurIPS 2018), Montréal, Canada, December 2-8,* (pp. 1-11) Montreal, Canada: Neural Information Processing Systems Foundation. (Published)

Optimal in-place suffix sorting, by LI, Zhize; LI, Jian; HUO, Hongwei. (2018.0). *Proceedings of the 25th International Symposium on String Processing and Information Retrieval (SPIRE 2018), Lima, Peru, October 9-11,* (pp. 268-284) Cham: Springer. https://doi.org/10.1007/978-3-030-00479-8_22 (Published)

A two-stage mechanism for ordinal peer assessment, by LI, Zhize; ZHANG, Le; FANG, Zhixuan; LI, Jian. (2018.0). *Proceedings of the 11th International Symposium on Algorithmic Game Theory (SAGT 2018), Beijing, China, September 11-14,* (pp. 176-188) Beijing, China: Springer. https://doi.org/10.1007/978-3-319-99660-8_16 (Published)

On top-k selection in multi-armed bandits and hidden bipartite graphs, by CAO, Wei; LI, Jian; TAO, Yufei; LI, Zhize. (2015.0). *NIPS'15: Proceedings of the 28th International Conference on Neural Information Processing Systems, Montreal Canada, 2015 December 7-12,* (pp. 1036-1044) Montreal, Canada: Neural Information Processing Systems Foundation. https://doi.org/10.5555/2969239.2969355 (Published)

Conference Papers

Tutorial: "Advances in federated optimization: Efficiency, resiliency, and privacy", by CHI, Yuejie; LI, Zhize. (2023.0). *The 48th IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP 2023), Rhodes Island, Greece, June 4-5,* Rhodes Island, Greece. (Presented)

Research Grants

Singapore Management University

Federated Learning with Limited Bandwidth and Heterogeneous Data, SMU Internal Grant, Ministry of Education (MOE) Tier 1 , PI (Project Level): Zhize LI, 2024, S$120,000

Other Institutions

Optimal Compression Algorithms for Large-Scale, High-Dimensional and Multi-criteria Clustering, General Program of National Natural Science Foundation, National Natural Science Foundation of China, Co-PI (Project Level): Zhize LI, 2025, CNY500,000

Clustering Models, Complexity Analysis and Efficient Algorithms for Large-Scale Data, Key Program of National Natural Science Foundation, National Natural Science Foundation of China, Co-PI (Project Level): Zhize LI, 2024, CNY2,300,000

TEACHING

Courses Taught

Singapore Management University

Undergraduate Programmes :

Computer Science Project Experience

Introduction to Artificial Intelligence

Postgraduate Research Programmes :

Empirical Research Project 1

Empirical Research Project 2

UNIVERSITY SERVICE

Singapore Management University

Committee Member, Undergraduate Admissions Interviews, Apr 2024 - Present

EXTERNAL SERVICE – PROFESSIONAL

Area Chair, International Conference on Machine Learning (ICML 2025, ICML 2024), 2024 - Present

Committee Member, Senior Program Committee, International Joint Conference on Artificial Intelligence (IJCAI 2023, IJCAI 2021), 2021 - Present

Committee Member, Program Committee, SODA 2026, NeurIPS 2024, NeurIPS 2022, ICML 2022, ICLR 2022, MLSys 2022, ALT 2022, NeurIPS 2021, ICML 2021, STOC 2021, COLT 2021, ICLR 2021, NeurIPS 2020, ICML 2020, COLT 2020, AAAI 2020, NeurIPS 2019, ICML 2019, COLT 2019, ECML 2019, STOC 2019, COLT 2018, ICML 2017, AAAI 2017, 2017 - Present

Reviewer Journal Article, Journal of Machine Learning Research (JMLR), SIAM Journal on Optimization (SIOPT), IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI), IEEE Transactions on Signal Processing (TSP), IEEE Transactions on Parallel and Distributed Systems (TPDS), IEEE Transactions on Neural Networks and Learning Systems (TNNLS), IEEE/ACM Transactions on Networking (TON), Operations Research, Mathematics of Operations Research, Journal of the Royal Statistical Society (JRSS), Computational Optimization and Applications (COAP), 2016 - Present