

# Zhize Li (李志泽)



IIIS, Tsinghua University

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## EDUCATION

Sep, 2014 - Jul, 2019 Ph.D. in Computer Science	Institute for Interdisciplinary Information Sciences (IIIS) <b>Tsinghua University</b> Advisor: <a href="#">Prof. Jian Li</a>
Jan - Jun & Jul - Sep, 2018 Visiting Scholar	Department of Computer Science <b>Duke University</b> Host: <a href="#">Prof. Rong Ge</a>
Jun - Jul, 2018 Visiting Scholar	H. Milton Stewart School of Industrial & Systems Engineering <b>Georgia Institute of Technology</b> Host: <a href="#">Prof. Guanghui (George) Lan</a>
Aug, 2010 - Jul, 2014 B.E. in Computer Science	Department of Computer Science <b>Xidian University</b> GPA Ranking: 2/419

PhD thesis: **Simple and Fast Optimization Methods for Machine Learning**. June, 2019.  
**2019 Tsinghua Outstanding Doctoral Dissertation Award.**

## RESEARCH INTERESTS

- I am interested in optimization, machine learning and theoretical computer science.
- Convex/Nonconvex/Distributed Optimization, Machine Learning
  - Algorithm Design and Data Structures, Game Theory

## EXPERIENCE/SERVICES

- **Conference reviewer:** NeurIPS 2019, ECML 2019, COLT 2019, ICML 2019, STOC 2019, COLT 2018, ICML 2017, AAAI 2017, ICALP 2016.
- **Journal reviewer:** Journal of Machine Learning Research (JMLR), IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI), IEEE Transactions on Parallel and Distributed Systems (TPDS), IEEE/ACM Transactions on Networking (ToN).
- Sep, 2014 - Jun, 2019 Research Assistant (**RA**)  
**Tsinghua-MIT-CUHK Research Center for Theoretical Computer Science**
- Feb, 2017 - Jun, 2017 Teaching Assistant (**TA**)  
**Advanced Theoretical Computer Science** for graduate students
- Sep, 2015 - Dec, 2015 Teaching Assistant (**TA**)  
**Algorithm Design** for undergraduate students ([Yao Class](#))
- The 2016 National Combinatorial Optimization Summer School  
Courses: Computational Complexity, Approximation Algorithms, Randomized Algorithms  
**Outstanding Student (top 10/110)**
- **Algorithm Engineer Intern:** Alibaba (Jul - Aug, 2013), NetEase (Jun - Aug, 2017)

## SELECTED PUBLICATIONS

1. **Zhize Li, Jian Li. A Simple Proximal Stochastic Gradient Method for Nonsmooth Nonconvex Optimization.** In *32nd Conference on Neural Information Processing Systems (NeurIPS 2018)*. **Spotlight.**  
(We propose a ProxSVRG+ algorithm and prove that it is the first stochastic algorithm (using constant minibatch, thus more practical) performing better than proximal gradient descent algorithm (using the whole dataset in each update), which solves an important open problem posed by Reddi et al. in NIPS 2016.)

2. **Zhize Li**, Jian Li, Hongwei Huo. **Optimal In-Place Suffix Sorting**. In *25th International Symposium on String Processing and Information Retrieval (SPIRE 2018)*. Invited.  
A previous short version appeared in *28th IEEE Data Compression Conference (DCC 2018)*.  
(We give the first in-place suffix array (a fundamental data structure in string processing and data compression, as a space-efficient alternative to suffix tree) construction algorithm which is optimal both in time and space. In particular, our algorithm solves the important open problem posed by Franceschini and Muthukrishnan in ICALP 2007.)
3. Guanghui Lan, Zhize Li, Yi Zhou (alphabetical order). **A Unified Variance-Reduced Accelerated Gradient Method for Convex Optimization**. Submitted to **NeurIPS 2019**.  
(We propose the first *optimal unified* algorithm for *convex optimization*, which is much better than the current state-of-the-art result given by Allen-Zhu in STOC 2017.)
4. **Zhize Li**. **SSRGD: Simple Stochastic Recursive Gradient Descent for Escaping Saddle Points**. Submitted to **NeurIPS 2019**.  
(We propose a simple *near-optimal* algorithm for *nonconvex optimization*. We prove that its convergence result for finding an  $\epsilon$ -first-order stationary point is  $O(n + \sqrt{n}/\epsilon^2)$  which almost matches the lower bound  $\Omega(\sqrt{n}/\epsilon^2)$ . Since first-order stationary points can be saddle points, local maxima or local minima in nonconvex optimization, we further prove that our algorithm can escape saddle points and local maxima for finding a local minimum with a similar near-optimal convergence result. This work improves our previous two work in NeurIPS 2018 and COLT 2019.)

## FULL PUBLICATIONS (BY TOPIC)

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### ► Optimization Algorithms

1. Guanghui Lan, Zhize Li, Yi Zhou (alphabetical order). **A Unified Variance-Reduced Accelerated Gradient Method for Convex Optimization**. Submitted to **NeurIPS 2019**.
2. **Zhize Li**. **SSRGD: Simple Stochastic Recursive Gradient Descent for Escaping Saddle Points**. Submitted to **NeurIPS 2019**.
3. **Zhize Li**, Wei Zhang, Kees Roos. **A Fast Polynomial Primal-Dual Projection Algorithm for Linear Programming**. In *23rd International Symposium on Mathematical Programming (ISMP 2018)*. Talk. Full version was submitted to **SODA 2020**.
4. Rong Ge, Zhize Li, Weiyao Wang, Xiang Wang (alphabetical order). **Stabilized SVRG: Simple Variance Reduction for Nonconvex Optimization**. In *32nd Annual Conference on Learning Theory (COLT 2019)*.
5. **Zhize Li**, Jian Li. **A Simple Proximal Stochastic Gradient Method for Nonsmooth Nonconvex Optimization**. In *32nd Conference on Neural Information Processing Systems (NeurIPS 2018)*. Spotlight.
6. **Zhize Li**, Jian Li. **A Fast Anderson-Chebyshev Mixing Method for Nonlinear Optimization**. Manuscript in [arXiv 1809.02341](https://arxiv.org/abs/1809.02341).

### ► Machine Learning

1. **Zhize Li**, Tianyi Zhang, Shuyu Cheng, Jun Zhu, Jian Li. **Stochastic Gradient Hamiltonian Monte Carlo with Variance Reduction for Bayesian Inference**. (**Machine Learning**), journal, accepted for publication.
2. Rong Ge, Rohith Kuditipudi, Zhize Li, Xiang Wang (alphabetical order). **Learning Two-layer Neural Networks with Symmetric Inputs**. In *7th International Conference on Learning Representations (ICLR 2019)*.
3. Yu Shi, Jian Li, **Zhize Li**. **Gradient Boosting With Piece-Wise Linear Regression Trees**. In *28th International Joint Conference on Artificial Intelligence (IJCAI 2019)*.
4. Wei Cao, Jian Li, Yufei Tao, **Zhize Li**. **On Top-k Selection in Multi-Armed Bandits and Hidden Bipartite Graphs**. In *28th Conference on Neural Information Processing Systems (NIPS 2015)*.

### ► Algorithms and Data Structures

1. **Zhize Li**, Jian Li, Hongwei Huo. **Optimal In-Place Suffix Sorting**. In *25th International Symposium on String Processing and Information Retrieval (SPIRE 2018)*. Invited.  
A previous short version appeared in *28th IEEE Data Compression Conference (DCC 2018)*.

2. **Zhize Li**, Le Zhang, Zhixuan Fang, Jian Li. **Optimal Two-Stage Mechanism for Ordinal Peer Assessment**. In *11th International Symposium on Algorithmic Game Theory (SAGT 2018)*.

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## INVITED TALKS/POSTERS

1. [China Theory Week 2018](#) (founded by [Prof. Andrew Chi-Chih Yao](#) in 2007) [slides]
2. The 16th [China Symposium on Machine Learning and Applications](#) (MLA'18) [slides] [poster]

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## CONFERENCE TALKS/POSTERS

NeurIPS 2018, SPIRE 2018, SAGT 2018, ISMP 2018, DCC 2018, NIPS 2015.

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## SELECTED AWARDS

- National Scholarship (top 1%)
- Pacesetter of Outstanding Graduates (highest)
- The First Prize in Collegiate Advanced Mathematics Contest (highest)

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## REFERENCES

- **Prof. Jian Li**  
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- **Prof. Rong Ge**  
Assistant Professor  
Department of Computer Science, Duke University  
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Homepage: <https://users.cs.duke.edu/~rongge/>
- **Prof. Guanghui (George) Lan**  
A. Russell Chandler III Early Career Professor and Associate Professor  
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