

Education

2014-2019: Doctor of Philosophy, *Electrical Engineering, Colorado School of Mines*, Golden, Colorado, USA.

Advisor: Prof. Gongguo Tang

2013-2014: Master of Science, *Electrical Engineering, Zhejiang University of Technology*, Zhejiang, China.

Advisor: Prof. Gang Li

2009-2013: Bachelor of Engineering, *Electrical Engineering, Zhejiang University of Technology*, Zhejiang, China.

Advisor: Prof. Gang Li

Research Interests

Apply convex and non-convex optimization methods to model and solve problems in signal processing, physical sciences, and machine learning. Especially interested in developing scalable optimization algorithms with provable guarantees.

Preprints

1. The Geometric Effects of Distributing Constrained Nonconvex Optimization Problems. M. B. Wakin, G. Tang, Q. Li, Z. Zhu, X. Yang. In review.
2. Second-order Convergence of Bregman ADMM. Q. Li, Z. Zhu, G. Tang, M. B. Wakin. In review.
3. Provable Bregman-divergence based Methods for Nonconvex and Non-Lipschitz Problems. Q. Li*, Z. Zhu*, G. Tang, M. B. Wakin. Preprint, 2019.
4. The Global Optimization Geometry of Low-Rank Matrix Optimization. Z. Zhu, Q. Li, G. Tang, M. B. Wakin. Preprint, 2017.
5. A Super-Resolution Framework for Tensor Decomposition. Q. Li, A. Prater, L. Shen, G. Tang. Preprint, 2016.

Book Chapters

Robust Principal Component Analysis based on Low-Rank and Block-Sparse Matrix Decomposition. Q. Li, G. Tang, A. Nehorai. *Handbook of Robust Low-Rank and Sparse Matrix Decomposition: Applications in Image and Video Processing*. CRC Press, 2016.

Journal Papers

1. Optimized Sparse Projections for Compressive Sensing. T. Hong, X. Li, Z. Zhu, Q. Li. *Signal Processing* 159: 119-129, 2019.
2. Approximate Support Recovery of Atomic Line Spectral Estimation: A Tale of Resolution and Precision. Q. Li, G. Tang. *Applied and Computational Harmonic Analysis*, 2018.
3. Global Optimality in Low-rank Matrix Optimization. Z. Zhu, Q. Li, G. Tang, M. B. Wakin. *IEEE Transactions on Signal Processing* 66(13): 3614-3628, 2018.
4. The Nonconvex Geometry of Low-rank Matrix Optimization. Q. Li, Z. Zhu, G. Tang. *Information and Inference: A Journal of the IMA* 8(1): 51-96, 2018.
5. On Collaborative Compressive Sensing Systems: The Framework, Design, and Algorithm. Z. Zhu, G. Li, J. Ding, Q. Li, X. He. *SIAM Journal on Imaging Sciences* 11(2): 1717-1758, 2018.
6. Alternating Optimization of Sensing Matrix and Sparsifying Dictionary for Compressed Sensing. H. Bai, X. Li, S. Li, Q. Li, Q. Jiang, L. Chang. *IEEE Transactions on Signal Processing* 63(6): 1581-1594, 2015.

Conference Papers

1. Cubic Regularization for Differentiable Games. S. Li, Y. Xie, Q. Li, G. Tang. *Advances in Neural Information Processing Systems (NeurIPS 2019) Workshop on Smooth Games Optimization*.
2. Geometry Correspondence between Empirical and Population Games. S. Li, Q. Li, G. Tang, M. B. Wakin. *Advances in Neural Information Processing Systems (NeurIPS 2019) Workshop on Smooth Games Optimization*.
3. Global Optimality in Distributed Low-rank Matrix Factorization. Z. Zhu*, Q. Li*, X. Yang, G. Tang, M. B. Wakin. *Advances in Neural Information Processing Systems (NeurIPS 2019)*.
4. General Tensor Recovery via Alternating Minimization. Q. Li, K. Liu, G. Tang, H. Wang. *ACM SIGKDD Conference On Knowledge Discovery And Data Mining (KDD 2019) Workshop on Tensor Methods*.
5. The Geometry of Orthogonal Dictionary Learning using L1 Minimization, Q. Li, Z. Zhu, M. B. Wakin, G. Tang. *Invitation paper. IEEE 53rd Asilomar Conference on Signals, Systems and Computers (ACSSC 2019)*.
6. Alternating Minimizations Converge to Second-Order Optimal Solutions. Q. Li*, Z. Zhu*, G. Tang. *International Conference on Machine Learning (ICML 2019)*.
7. Spherical Principal Component Analysis. K. Liu*, Q. Li*, H. Wang, G. Tang. *SIAM International Conference on Data Mining (SDM 2019)*.
8. The Geometry of Equality-Constrained Global Consensus Problems. Q. Li, Z. Zhu, G. Tang, M. B. Wakin. *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP 2019)*.
9. Dropping Symmetry for Fast Symmetric Nonnegative Matrix Factorization. Z. Zhu, X. Li, K. Liu, Q. Li. *Advances in Neural Information Processing Systems (NeurIPS 2018)*.
10. The Nonconvex Geometry of Low-rank Matrix Optimizations with General Objective Functions. Q. Li, G. Tang. *IEEE Global Conference on Signal and Information Processing (GlobalSIP 2017)*.
11. Global Optimality in Low-rank Matrix Optimization. Z. Zhu, Q. Li, G. Tang, M. B. Wakin. *IEEE Global Conference on Signal and Information Processing (GlobalSIP 2017)*.
12. Convex and Nonconvex Geometries of Symmetric Tensor Factorization. Q. Li, G. Tang. *IEEE 51st Asilomar Conference on Signals, Systems and Computers (ACSSC 2017)*.
13. JAZZ: A Companion to MUSIC for Frequency Estimation with Missing Data. Q. Li, S. Li, H. Mansour, M. B. Wakin, D. Yang, Z. Zhu. *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP 2017)*.
14. Approximate Support Recovery of Atomic Line Spectral Estimation: A Tale of Resolution and Precision. Q. Li, G. Tang. *IEEE Global Conference on Signal and Information Processing (GlobalSIP 2016)*.
15. Overcomplete Tensor Decomposition via Convex Optimization. Q. Li, A. Prater, L. Shen, G. Tang. *IEEE International Workshop on Computational Advances in Multi-Sensor Adaptive Processing (CAMSAP 2015)*.
16. Joint Rank and Positive Semidefinite Constrained Optimization for Projection Matrix. Q. Li, S. Li, H. Bai, X. Li, L. Chang. *IEEE International Conference on Industrial Engineering Applications (ICIEA 2014)*.
17. Iteratively Reweighted Least Squares for Block-sparse Recovery. S. Li, Q. Li, G. Li, X. He, L. Chang. *IEEE International Conference on Industrial Engineering Applications (ICIEA 2014)*.
18. Simultaneous Sensing Matrix and Sparsifying Dictionary Optimization for Block-sparse Compressive Sensing. S. Li, Q. Li, G. Li, L. Chang, X. He. *IEEE International Conference on Mobile Ad-Hoc and Sensor Systems (MASS 2013)*.
19. Robust Projection Matrix Optimization from the MSE View for Compressive Sensing Systems. Q. Li, Z. Zhu, G. Li, L. Chang, S. Li. *IEEE International Conference on Signal Processing, Communications and Computing (ICSPCC 2013)*.
20. Projection Matrix Optimization for Block-sparse Compressive Sensing. S. Li, Z. Zhu, G. Li, L. Chang, Q. Li. *IEEE International Conference on Signal Processing, Communications and Computing (ICSPCC 2013)*.
21. Projection Matrix Optimization Based on SVD for Compressive Sensing Systems. Q. Li, Z. Zhu, S. Tang, L. Chang, G. Li. *The 32nd China Control Conference (CCC 2013)*.

Technical Reports

1. Convex and Nonconvex Optimization Geometries. Ph.D. Thesis. 2019.
2. Geometry of Factored Nuclear Norm Regularization. Q. Li, Z. Zhu, G. Tang. 2017.

Reviewer

- IEEE JSTSP
- IEEE Transactions on Signal Processing
- IEEE Communications Letters
- Constructive Approximation
- Signal Processing
- IEEE Transactions on Information Theory
- IEEE Signal Processing Letters
- IEEE Control Systems Letters
- Journal of Machine Learning Research
- SIAM Journal on Imaging Sciences

Awards

- Travel Awards: GlobalSIP 2016, NeurIPS 2018, ICERM Workshop on Computer Vision 2019, ICML 2019, NeurIPS 2019.
- Best Graduate Research Presentation at the annual Graduate Research and Discovery Symposium (GRADS 2016).
- China National Scholarship, 2014. The Chinese Ministries of Education and Finance.
- Outstanding Graduate, 2013. Zhejiang University of Technology, China.
- Academic Scholarship: 2010, 2011, 2012, 2013. Zhejiang University of Technology, Zhejiang, China.

TALKS

- 09/2019 - Invited Talk. University of Minnesota Twin Cities. "Convex and Nonconvex Optimization Geometries."
- 08/2019 - KDD 2019 Workshop on Tensor Methods. "General Tensor Recovery via Alternating Minimization."
- 06/2019 - ICML 2019. "Alternating Minimizations Converge to Second Optimal Solutions."
- 10/2017 - ACSSC 2017. "Convex and Nonconvex Geometries of Symmetric Tensor Factorization."
- 04/2017 - GRADS 2017. Colorado School of Mines. "The Nonconvex Geometry of Low-Rank Matrix Optimizations."
- 03/2017 - ICASSP 2017. "JAZZ: A Companion to MUSIC for Frequency Estimation with Missing Data."
- 01/2017 - C-MAPP 2016. Colorado School of Mines. "The Nonconvex Geometry of Low-Rank Matrix Optimizations."
- 12/2016 - GlobalSIP 2016. "Approximate Support Recovery of Atomic Line Spectral Estimation."
- 03/2016 - GRADS 2016. Colorado School of Mines. "Overcomplete Tensor Decomposition via Convex Optimization."
- 01/2016 - C-MAPP 2016. Colorado School of Mines. "Overcomplete Tensor Decomposition via Convex Optimization."
- 06/2014 - ICIEA 2014. "Joint rank and positive semidefinite constrained optimization for projection matrix."
- 07/2013 - CCC 2014. "Projection Matrix Optimization Based on SVD for Compressive Sensing Systems."

Teaching Experiences

- Recitation Instructor, *EENG310 - Information Systems Science I*, Fall 2019. Colorado School of Mines, Colorado, USA.
- Guest Lecturer, *EENG 598B - Numerical Optimization*, Spring 2019. Colorado School of Mines, Colorado, USA.
- Teaching Assistant, *EGGN 250 - Multidisciplinary EG LAB I*, Spring 2015. Colorado School of Mines, Colorado, USA.
- Teaching Assistant, *Adaptive Signal Processing*, Spring 2014. Zhejiang University of Technology, Zhejiang, China.
- Teaching Assistant, *Signals and Systems*, Fall 2013. Zhejiang University of Technology, Zhejiang, China.