Li, Gen

Name	Gen Li
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Education

2022.1-now	University of Pennsylvania.	**Postdoc**
	Statistics and Data Science, Wharton School	Advisor: Yuxin Chen and Yuting Wei
2021.9-2021.12	Princeton University.	**Postdoc**
	Electrical and Computer Engineering	Advisor: Yuxin Chen
2016.8-2021.7	Tsinghua University.	**Ph.D. (Hons.)**
	Electronic Engineering	Advisor: Yuantao Gu
2012.8-2016.7	Electronic Engineering, Tsinghua University.	**Bachelor of Engineering**
2013.8-2016.7	Mathematics, Tsinghua University.	**Bachelor of Science**

Research Interest

Reinforcement learning, high-dimensional statistics, machine learning, signal processing, mathematical optimization

Preprint

P1. G. Li, Y. Yan, Y. Chen, J. Fan, "Minimax-optimal reward-agnostic exploration in reinforcement learning," arXiv preprint arXiv:2304.07278, 2023.

P2. G. Li, W. Fan, and Y. Wei, "Approximate message passing from random initialization with applications to Z_2 synchronization," arXiv preprint arXiv:2302.03682, 2023.

P3. G. Li, Y. Chen, Y. Chi, H. V. Poor, and Y. Chen, "Fast Computation of Optimal Transport via Entropy-Regularized Extragradient Methods," arXiv preprint arXiv:2301.13006, 2023.

P4. G. Li, Y. Chi, Y. Wei, and Y. Chen, "Minimax-Optimal Multi-Agent RL in Markov Games With a Generative Model," arXiv preprint arXiv:2208.10458, 2022.

P5. G. Li, and Y. Wei, "A Non-Asymptotic Framework for Approximate Message Passing in Spiked Models," arXiv preprint arXiv:2208.03313, 2022.

P6. G. Li, L. Shi, Y. Chen, Y. Chi, and Y. Wei, "Settling the sample complexity of model-based offline reinforcement learning," arXiv preprint arXiv:2204.05275, 2022.

P7. Y. Yan, G. Li, Y. Chen, J. Fan, "Model-Based Reinforcement Learning Is Minimax-Optimal for Offline Zero-Sum Markov Games," arXiv preprint arXiv:2206.04044, 2022.

P8. Y. Yan, G. Li, Y. Chen, J. Fan, "The Efficacy of Pessimism in Asynchronous Q-Learning," arXiv preprint arXiv:2203.07368, 2022.

P9. G. Li, C. Cai, H. V. Poor, and Y. Chen, "Minimax Estimation of Linear Functions of Eigenvectors in the Face of Small Eigen-Gaps," arXiv preprint arXiv:2104.03298, 2021.

Journal Articles

J1. G. Li, C Cai, Y. Chen, Y. Wei, and Y. Chi, "Is Q-Learning Minimax Optimal? A Tight Sample Complexity Analysis," accepted to *Operations Research*, 2023.

J2. G. Li, Y. Wei, Y. Chi, Y. Gu, and Y. Chen, "Breaking the Sample Size Barrier in Model-Based Reinforcement Learning with a Generative Model," accepted to *Operations Research*, 2023.

J3. G. Li, and J. Ding, "Towards Understanding Variation-Constrained Deep Neural Networks," accepted to *IEEE Transactions on Signal Processing*, 2023.

J4. G. Li, Y. Wei, Y. Chi, and Y. Chen, "Softmax Policy Gradient Methods Can Take Exponential Time to Converge," accepted to *Mathematical Programming*, 2022.

J5. G. Li, L. Shi, Y. Chen, Y. Gu, and Y. Chi, "Breaking the Sample Complexity Barrier to Regret-Optimal Model-Free Reinforcement Learning," accepted to *Information and Inference: A Journal of the IMA*, 2022.

J6. G. Li, Y. Wei, Y. Chi, Y. Gu, and Y. Chen, "Sample Complexity of Asynchronous Q-Learning: Sharper Analysis and Variance Reduction," *IEEE Transactions on Information Theory*, 68 (1), 448-473, January 2022.

J7. C. Cai, G. Li, H. V. Poor, and Y. Chen, "Nonconvex Low-Rank Tensor Completion from Noisy Data," *Operations Research*, vol. 70, no. 2, pp. 1219–1237, 2022.

J8. G. Li, Y. Gu, and J. Ding, "ℓ_1 Regularization in Two-Layer Neural Networks," *IEEE Signal Processing Letters*, 29, 135-139, 2021.

J9. C. Cai, G. Li, Y. Chi, H. V. Poor, and Y. Chen, "Subspace Estimation from Unbalanced and Incomplete Data Matrices: $\ell_{2,\infty}$ Statistical Guarantees," *Annals of Statistics*, 49 (2), 944-967, April 2021.

J10. G. Li, Q. Liu, and Y. Gu, "Rigorous Restricted Isometry Property for Low-Dimensional Subspaces," *Applied and Computational Harmonic Analysis*, 49(2):608-635, September 2020.

J11. Y. M. Lu, and G. Li, "Phase transitions of spectral initialization for high-dimensional non-convex estimation," *Information and Inference: A Journal of the IMA*, 9(3), 507-541, September 2020.

J12. G. Li, X. Xu, and Y. Gu, "Lower Bound for RIP Constants and Concentration of Sum of Top Order Statistics," *IEEE Transactions on Signal Processing*, 68:3169-3178, April 2020.

J13. X. Xu, G. Li, and Y. Gu, "Unraveling the Veil of Subspace RIP Through Near-Isometry on Subspaces," *IEEE Transactions on Signal Processing*, 68:3117-3131, April 2020.

J14. G. Li, and Y. Gu, "Restricted Isometry Property of Gaussian Random Projection for Finite Set of Subspaces," *IEEE Transactions on Signal Processing*, 66(7):1705-1720, April 2018.

J15. L. Meng, G. Li, J. Yan, and Y. Gu, "A General Framework for Understanding Compressed Subspace Clustering Algorithms," *IEEE Journal of Selected Topics in Signal Processing*, 12(6):1504-1519, December 2018.

J16. J. Wang, G. Li, L. Rencker, W. Wang, and Y. Gu, "An RIP-Based Performance Guarantee of Covariance-Assisted Matching," *IEEE Signal Processing Letters*, 25(6), 828-832, March 2018.

J17. Y. Chen, G. Li, and Y. Gu, "Active Orthogonal Matching Pursuit for Sparse Subspace Clustering," *IEEE Signal Processing Letters*, 25(2):164 - 168, February 2018.

Conference Papers

C1. G. Li, Y. Chi, Y. Wei, and Y. Chen, "Minimax-Optimal Multi-Agent RL in Markov Games With a Generative Model," *Neural Information Processing Systems (NeurIPS)*, New Orleans, USA, November 2022 (**Oral presentation, Top 1.9%**).

C2. L. Shi, G. Li, Y. Wei, Y. Chen, Y. Chi, "Pessimistic Q-Learning for Offline Reinforcement Learning: Towards Optimal Sample Complexity," *International Conference on Machine Learning (ICML)*, Baltimore, USA, July 2022.

C3. G. Li, L. Shi, Y. Chen, Y. Gu, and Y. Chi, "Breaking the Sample Complexity Barrier to Regret-Optimal Model-Free Reinforcement Learning," *Neural Information Processing Systems (NeurIPS)*, December 2021 (**Spotlight presentation, Top 2.9%**).

C4. G. Li, Y. Chen, Y. Chi, Y. Gu, and Y. Wei, "Sample-Efficient Reinforcement Learning Is Feasible for Linearly Realizable MDPs with Limited Revisiting," *Neural Information Processing Systems (NeurIPS)*, December 2021.

C5. G. Li and Y. Gu, "Theory of Spectral Method for Union of Subspaces-Based Random Geometry Graph," *International Conference on Machine Learning (ICML)*, July 2021.

C6. G. Li, C Cai, Y. Chen, Y. Gu, Y. Wei, and Y. Chi, "Tightening the Dependence on Horizon in the Sample Complexity of Q-Learning," *International Conference on Machine Learning (ICML)*, July 2021.

C7. G. Li, Y. Wei, Y. Chi, Y. Gu, and Y. Chen, "Softmax Policy Gradient Methods Can Take Exponential Time to Converge," *Conference on Learning Theory (COLT)*, August 2021.

C8. G. Li, Y. Wei, Y. Chi, Y. Gu, and Y. Chen, "Breaking the Sample Size Barrier in Model-Based Reinforcement Learning with a Generative Model," *Neural Information Processing Systems (NeurIPS)*, December 2020

C9. G. Li, Y. Wei, Y. Chi, Y. Gu, and Y. Chen, "Sample Complexity of Asynchronous Q-Learning: Sharper Analysis and Variance Reduction," *Neural Information Processing Systems (NeurIPS)*, December 2020

C10. C. Cai, G. Li, Y. Chi, H. V. Poor, and Y. Chen, "Nonconvex Low-Rank Symmetric Tensor Completion from Noisy Data," *Neural Information Processing Systems (NeurIPS)*, Vancouver, Canada, December 2019.

C11. G. Li, J. Yan, and Y. Gu, Information Theoretic Lower Bound of Restricted Isometry Property Constant, *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, Brighton, UK, May, 2019.

C12. G. Li, J. Yan, and Y. Gu, "Outage Probability Conjecture Does Not Hold for Two-Input-Multiple-Output (TIMO) System," *IEEE International Symposium on Information Theory (ISIT)*, Vail, CO, USA, June 2018.

C13. G. Li, Y. Jiao, and Y. Gu, "Convergence Analysis on A Fast Iterative Phase Retrieval Algorithm without Independence Assumption," *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, Calgary, Canada, April 2018.

C14. Y. Jiao, G. Li, and Y, Gu, "Principal Angles Preserving Property of Gaussian Random Projection for Subspaces," *IEEE Global Conference on Signal and Information Processing (GlobalSIP)*, Montreal, Canada, November 2017.

C15. G. Li and Y. Gu, "Distance-preserving property of random projection for subspaces," *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, New Orleans, USA, March 2017.

C16. G. Li, Y. Gu, and Y. M. Lu, "Phase Retrieval Using Iterative Projections: Dynamics in the Large Systems Limit," *IEEE Allerton Conference on Communications, Control, and Computing*, Allerton, USA, September 2015.

Honors

2020	Excellent graduate award.	Tsinghua University (4 in EE department)
2020	Excellent thesis award.	Tsinghua University (6 in EE department)

Other Visiting Experience

2015.7 - 2015.8	Electrical Engineering, Harvard University	Host: Yue M. Lu
2018.9 - 2018.11	Electrical and Computer Engineering, Princeton University	Host: Yuxin Chen
2019.8 - 2019.11	Electrical and Computer Engineering, Princeton University	Host: Yuxin Chen
2023.2 - 2023.3	Electrical and Computer Engineering, Carnegie Mellon University	Host: Yuejie Chi

Students that I help mentor

- Wei Fan (Ph.D. student, UPenn Wharton), 2022 - now
- Laixi Shi (Ph.D. student, CMU ECE), 2021 - now
- Jack Ji (Ph.D. student, Princeton ECE), 2022 - now
- Yanxi Chen (Ph.D. student, Princeton ECE), 2022 - now
- Weichen Wu (Ph.D. student, CMU Stats), 2022 - now
- Xingyu Xu (Ph.D. student, Tsinghua EE), 2018 - 2020
- Yuchen Jiao (Ph.D. student, Tsinghua EE), 2017 - 2020
- Jiayang Wang (undergraduate student, Tsinghua EE), 2017 - 2018

Teaching Experience

- Signals and Systems, TA, Tsinghua EE, (2017 - 2021)
- Matlab Programming, TA, Tsinghua EE, (2017, 2018)

Professional Services

- Journal review: Machine Learning, SIAM Journal on Imaging Sciences
- Conference review: NeurIPS (2021, 2022), ICML (2021, 2022), ICLR 2022