

Quanquan Gu

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RESEARCH INTERESTS	Machine Learning, High-dimensional Statistical Inference, Optimization, Data Mining	
PROFESSIONAL EXPERIENCE	Department of Computer Science, University of California, Los Angeles, CA, USA 2018.7 - now <ul style="list-style-type: none">• Tenure-track Assistant Professor Simons Institute for the Theory of Computing, Online 2020.8 - 2020.12 <ul style="list-style-type: none">• Long-term Participant in the Theory of Reinforcement Learning Program Institute for Advanced Study, Princeton, NJ, USA 2019.10 - 2019.11 <ul style="list-style-type: none">• Short-term Visitor in the Special Year on Optimization, Statistics, and Theoretical Machine Learning Simons Institute for the Theory of Computing, Berkeley, CA, USA 2019.5 - 2019.8 <ul style="list-style-type: none">• Research Fellow in the Foundations of Deep Learning Summer Program Department of Computer Science, University of Virginia, VA, USA 2016 - 2018.6 <ul style="list-style-type: none">• Tenure-track Assistant Professor Department of Systems and Information Engineering, University of Virginia, VA, USA 2015 - 2017 <ul style="list-style-type: none">• Tenure-track Assistant Professor Department of Operations Research and Financial Engineering, Princeton University, NJ, USA 2014 - 2015 <ul style="list-style-type: none">• Postdoctoral Research Associate in Statistics	
EDUCATION	University of Illinois at Urbana-Champaign, IL, USA 2010 - 2014 <ul style="list-style-type: none">• Ph.D. in Computer Science Tsinghua University, Beijing, China 2007 - 2010 <ul style="list-style-type: none">• Master of Science in Control Science and Engineering Tsinghua University, Beijing, China 2003 - 2007 <ul style="list-style-type: none">• Bachelor of Engineering in Automation	
HONORS AND AWARDS	<ul style="list-style-type: none">• Alfred P. Sloan Research Fellowship 2022• AWS Machine Learning Research Award 2020• IJCAI Early Career Talk 2020• Simons Berkeley Research Fellowship 2019• Salesforce Deep Learning Research Award 2018• Adobe Data Science Research Award 2018• NSF CAREER Award 2017• UVa SEAS Research Innovation Award 2017• Yahoo! Academic Career Enhancement Award 2015• IBM PhD Fellowship 2013-2014• UIUC Computer Science Department Fellowship 2010• Best Master Thesis Award in Tsinghua University 2010	

TEACHING
EXPERIENCE

Instructor, University of California, Los Angeles

- CS 161: Fundamentals of AI (Winter 2020, Winter 2021)
- CS 260: Machine Learning Algorithms (Fall 2018, Spring 2020, Fall 2021)
- CS 269: Foundations of Deep Learning (Winter 2019, Spring 2021)

Instructor, University of Virginia

- CS 6316/SYS6016: Machine Learning (Spring 2018)
- CS 6501/SYS6003: Optimization for Machine Learning (Fall 2017)
- SYS 6003: Optimization Models and Methods (Fall 2015, 2016)
- SYS 4582/6016: Machine Learning (Spring 2017)
- SYS 3060: Stochastic Decision Models (Spring 2016)

Teaching Assistant, Department of Computer Science, UIUC

- CS 512: Data Mining: Principles and Algorithms (Spring 2013)
- CS 412: An Introduction to Data Warehousing and Data Mining (Fall 2012)

PUBLICATION

1. Yuan Cao, **Quanquan Gu** and Mikhail Belkin, Risk Bounds for Over-parameterized Maximum Margin Classification on Sub-Gaussian Mixtures, in Proc. of Advances in Neural Information Processing Systems (**NeurIPS**) 34, 2021.
2. Boxi Wu*, Jinghui Chen*, Deng Cai, Xiaofei He and **Quanquan Gu**, Do Wider Neural Networks Really Help Adversarial Robustness? in Proc. of Advances in Neural Information Processing Systems (**NeurIPS**) 34, 2021.
3. Spencer Frei and **Quanquan Gu**, Proxy Convexity: A Unified Framework for the Analysis of Neural Networks Trained by Gradient Descent, in Proc. of Advances in Neural Information Processing Systems (**NeurIPS**) 34, 2021.
4. Difan Zou*, Jingfeng Wu*, Vladimir Braverman, **Quanquan Gu**, Dean P. Foster and Sham M. Kakade, The Benefits of Implicit Regularization from SGD in Least Squares Problems, in Proc. of Advances in Neural Information Processing Systems (**NeurIPS**) 34, 2021.
5. Yinglun Zhu*, Dongruo Zhou*, Ruoxi Jiang*, **Quanquan Gu**, Rebecca Willett and Robert Nowak, Pure Exploration in Kernel and Neural Bandits, in Proc. of Advances in Neural Information Processing Systems (**NeurIPS**) 34, 2021.
6. Jiafan He, Dongruo Zhou and **Quanquan Gu**, Uniform-PAC Bounds for Reinforcement Learning with Linear Function Approximation, in Proc. of Advances in Neural Information Processing Systems (**NeurIPS**) 34, 2021.
7. Jiafan He, Dongruo Zhou and **Quanquan Gu**, Minimax Optimal Reinforcement Learning for Discounted MDPs, in Proc. of Advances in Neural Information Processing Systems (**NeurIPS**) 34, 2021.
8. Weitong Zhang, Dongruo Zhou, **Quanquan Gu**, Reward-Free Model-Based Reinforcement Learning with Linear Function Approximation, in Proc. of Advances in Neural Information Processing Systems (**NeurIPS**) 34, 2021.
9. Tianhao Wang*, Dongruo Zhou* and **Quanquan Gu**, Provably Efficient Reinforcement Learning with Linear Function Approximation Under Adaptivity Constraints, in Proc. of Advances in Neural Information Processing Systems (**NeurIPS**) 34, 2021.
10. Yifei Min*, Tianhao Wang*, Dongruo Zhou and **Quanquan Gu**, Variance-Aware Off-Policy Evaluation with Linear Function Approximation, in Proc. of Advances in Neural Information Processing Systems (**NeurIPS**) 34, 2021.
11. Luyao Yuan, Dongruo Zhou, Junhong Shen, Jingdong Gao, Jeffrey L Chen, **Quanquan Gu**, Ying Nian Wu and Song-Chun Zhu, Iterative Teacher-Aware Learning, in Proc. of Advances in Neural Information Processing Systems (**NeurIPS**) 34, 2021.
12. Hanxun Huang, Yisen Wang, Sarah Monazam Erfani, **Quanquan Gu**, James Bailey and Xingjun Ma, Exploring Architectural Ingredients of Adversarially Robust Deep Neural Networks, in Proc. of Advances in Neural Information Processing Systems (**NeurIPS**) 34, 2021.

13. Difan Zou*, Jingfeng Wu*, Vladimir Braverman, **Quanquan Gu** and Sham M. Kakade, Benign Overfitting of Constant-Stepsize SGD for Linear Regression, in Proc. of the 34th Annual Conference on Learning Theory (**COLT**), 2021.
14. Dongruo Zhou, **Quanquan Gu** and Csaba Szepesvari, Nearly Minimax Optimal Reinforcement Learning for Linear Mixture MDPs, in Proc. of the 34th Annual Conference on Learning Theory (**COLT**), 2021.
15. Tianyuan Jin, Pan Xu, Xiaokui Xiao and **Quanquan Gu**, Double Explore-then-Commit: Asymptotic Optimality and Beyond, in Proc. of the 34th Annual Conference on Learning Theory (**COLT**), 2021.
16. Difan Zou, Pan Xu and **Quanquan Gu**, Faster Convergence of Stochastic Gradient Langevin Dynamics for Non-Log-Concave Sampling, in Proc. of the 37th International Conference on Uncertainty in Artificial Intelligence (**UAI**), 2021.
17. Difan Zou and **Quanquan Gu**, On the Convergence of Hamiltonian Monte Carlo with Stochastic Gradients, in Proc. of the 38th International Conference on Machine Learning (**ICML**), 2021
18. Difan Zou*, Spencer Frei* and **Quanquan Gu**, Provable Robustness of Adversarial Training for Learning Halfspaces with Noise, in Proc. of the 38th International Conference on Machine Learning (**ICML**), 2021
19. Jiafan He, Dongruo Zhou and **Quanquan Gu**, Logarithmic Regret for Reinforcement Learning with Linear Function Approximation, in Proc. of the 38th International Conference on Machine Learning (**ICML**), 2021
20. Dongruo Zhou, Jiafan He and **Quanquan Gu**, Provably Efficient Reinforcement Learning for Discounted MDPs with Feature Mapping, in Proc. of the 38th International Conference on Machine Learning (**ICML**), 2021
21. Spencer Frei, Yuan Cao and **Quanquan Gu**, Agnostic Learning of Halfspaces with Gradient Descent via Soft Margins, in Proc. of the 38th International Conference on Machine Learning (**ICML**), 2021 (Long talk)
22. Spencer Frei, Yuan Cao and **Quanquan Gu**, Provable Generalization of SGD-trained Neural Networks of Any Width in the Presence of Adversarial Label Noise, in Proc. of the 38th International Conference on Machine Learning (**ICML**), 2021
23. Tianyuan Jin, Pan Xu, Jieming Shi, Xiaokui Xiao and **Quanquan Gu**, MOTS: Minimax Optimal Thompson Sampling, in Proc. of the 38th International Conference on Machine Learning (**ICML**), 2021
24. Tianyuan Jin, Jing Tang, Pan Xu, Keke Huang, Xiaokui Xiao and **Quanquan Gu**, Almost Optimal Anytime Algorithm for Batched Multi-Armed Bandits, in Proc. of the 38th International Conference on Machine Learning (**ICML**), 2021
25. Johannes Bracher et al., Short-term Forecasting of COVID-19 in Germany and Poland during the Second Wave—A Preregistered Study, Nature Communications, 2021.
26. Zixiang Chen*, Yuan Cao*, Difan Zou* and **Quanquan Gu**, How Much Overparameterization Is Sufficient to Learn Deep ReLU Networks? in Proc. of the 9th International Conference on Learning Representations (**ICLR**), 2021.
27. Weitong Zhang, Dongruo Zhou, Lihong Li and **Quanquan Gu**, Neural Thompson Sampling, in Proc. of the 9th International Conference on Learning Representations (**ICLR**), 2021.
28. Jingfeng Wu, Difan Zou, Vladimir Braverman and **Quanquan Gu**, Direction Matters: On the Implicit Regularization Effect of Stochastic Gradient Descent with Moderate Learning Rate, in Proc. of the 9th International Conference on Learning Representations (**ICLR**), 2021.
29. Lingxiao Wang, Kevin Huang, Tengyu Ma, **Quanquan Gu** and Jing Huang, Variance-reduced First-order Meta-learning for Natural Language Processing Tasks, in Proc. of 2021 Annual Conference of the North American Chapter of the Association for Computational Linguistics (**NAACL**), 2021.
30. Yuan Cao*, Zhiying Fang*, Yue Wu*, Ding-Xuan Zhou and **Quanquan Gu**, To-

- wards Understanding the Spectral Bias of Deep Learning, in Proc. of the 30th International Joint Conference on Artificial Intelligence (**IJCAI**), Montreal, Canada, 2021.
31. Bargav Jayaraman, Lingxiao Wang, Katherine Knipmeyer, **Quanquan Gu** and David Evans, Revisiting Membership Inference Under Realistic Assumptions. 21st Privacy Enhancing Technologies Symposium (**PETS**), 2021.
 32. Bao Wang*, Difan Zou*, **Quanquan Gu**, Stanley Osher, Laplacian Smoothing Stochastic Gradient Markov Chain Monte Carlo, SIAM Journal on Scientific Computing, 2020.
 33. Yue Wu, Weitong Zhang, Pan Xu and **Quanquan Gu**, A Finite Time Analysis of Two Time-Scale Actor Critic Methods, in Proc. of Advances in Neural Information Processing Systems (**NeurIPS**) 33, 2020.
 34. Spencer Frei, Yuan Cao and **Quanquan Gu**, Agnostic Learning of a Single Neuron with Gradient Descent, in Proc. of Advances in Neural Information Processing Systems (**NeurIPS**) 33, 2020.
 35. Zixiang Chen, Yuan Cao, **Quanquan Gu** and Tong Zhang, A Generalized Neural Tangent Kernel Analysis for Two-layer Neural Networks, in Proc. of Advances in Neural Information Processing Systems (**NeurIPS**) 33, 2020.
 36. Dongruo Zhou, Lihong Li and **Quanquan Gu**, Neural Contextual Bandits with UCB-Based Exploration in Proc. of the 37th International Conference on Machine Learning (**ICML'20**), 2020.
 37. Pan Xu and **Quanquan Gu**, A Finite-Time Analysis of Q-Learning with Neural Network Function Approximation in Proc. of the 37th International Conference on Machine Learning (**ICML'20**), 2020.
 38. Yonatan Dukler, **Quanquan Gu** and Guido Montufar, Optimization Theory for ReLU Neural Networks Trained with Normalization Layers in Proc. of the 37th International Conference on Machine Learning (**ICML'20**), 2020.
 39. Fabrice Harel-Canada, Lingxiao Wang, Muhammad Ali Gulzar, **Quanquan Gu** and Miryung Kim, Is Neuron Coverage a Meaningful Measure for Testing Deep Neural Networks? in Proc of ACM SIGSOFT International Symposium on the Foundations of Software Engineering (**ESEC/FSE'20**), Sacramento, California, USA, 2020.
 40. Jinghui Chen and **Quanquan Gu**, RayS: A Ray Searching Method for Hard-label Adversarial Attack in Proc of the 26th ACM SIGKDD Conference on Knowledge Discovery and Data Mining (**KDD'20**), San Diego, CA, USA, 2020.
 41. Dongruo Zhou, Pan Xu and **Quanquan Gu**, Stochastic Nested Variance Reduction for Nonconvex Optimization Journal of Machine Learning Research (**JMLR**), 2020.
 42. Jinghui Chen, Dongruo Zhou, Yiqi Tang, Ziyang Yang, Yuan Cao and **Quanquan Gu**, Closing the Generalization Gap of Adaptive Gradient Methods in Training Deep Neural Networks in Proc. of the 29th International Joint Conference on Artificial Intelligence (**IJCAI'20**), Yokohama, Japan , 2020.
 43. Bao Wang, **Quanquan Gu**, March Boedihardjo, Lingxiao Wang, Farzin Barekat and Stanley J. Osher, DP-LSSGD: A Stochastic Optimization Method to Lift the Utility in Privacy-Preserving ERM In Proc of the Mathematical and Scientific Machine Learning Conference (**MSML'20**), Princeton, New Jersey, USA, 2020.
 44. Xiao Zhang*, Jinghui Chen*, **Quanquan Gu** and David Evans, Understanding the Intrinsic Robustness of Image Distributions using Conditional Generative Models, In Proc of the 23rd International Conference on Artificial Intelligence and Statistics (**AISTATS'20**), Palermo, Sicily, Italy, 2020.
 45. Dongruo Zhou, Yuan Cao and **Quanquan Gu**, Accelerated Factored Gradient Descent for Low-Rank Matrix Factorization, In Proc of the 23rd International Conference on Artificial Intelligence and Statistics (**AISTATS'20**), Palermo, Sicily, Italy, 2020.
 46. Dongruo Zhou and **Quanquan Gu**, Stochastic Recursive Variance-Reduced Cubic Regularization Methods, In Proc of the 23rd International Conference on Artificial Intelligence and Statistics (**AISTATS'20**), Palermo, Sicily, Italy, 2020.

47. Difan Zou, Philip M. Long and **Quanquan Gu**, On the Global Convergence of Training Deep Linear ResNets, in Proc. of the 8th International Conference on Learning Representations (**ICLR'20**), Addis Ababa, Ethiopia, 2020.
48. Pan Xu, Felicia Gao and **Quanquan Gu**, Sample Efficient Policy Gradient Methods with Recursive Variance Reduction, in Proc. of the 8th International Conference on Learning Representations (**ICLR'20**), Addis Ababa, Ethiopia, 2020.
49. Lingxiao Wang, Jing Huang, Kevin Huang, Ziniu Hu, Guangtao Wang and **Quanquan Gu**, Improving Neural Language Generation with Spectrum Control, in Proc. of the 8th International Conference on Learning Representations (**ICLR'20**), Addis Ababa, Ethiopia, 2020.
50. Yisen Wang*, Difan Zou*, Jinfeng Yi, James Bailey, Xingjun Ma and **Quanquan Gu**, Improving Adversarial Robustness Requires Revisiting Misclassified Examples, in Proc. of the 8th International Conference on Learning Representations (**ICLR'20**), Addis Ababa, Ethiopia, 2020.
51. Jinghui Chen, Dongruo Zhou, Jinfeng Yi and **Quanquan Gu**, A Frank-Wolfe Framework for Efficient and Effective Adversarial Attacks, in Proc. of the 34th AAAI Conference on Artificial Intelligence (**AAAI'20**), New York, New York, USA, 2020.
52. Yuan Cao and **Quanquan Gu**, Generalization Error Bounds of Gradient Descent for Learning Over-parameterized Deep ReLU Networks, in Proc. of the 34th AAAI Conference on Artificial Intelligence (**AAAI'20**), New York, New York, USA, 2020.
53. Lingxiao Wang and **Quanquan Gu**, A Knowledge Transfer Framework for Differentially Private Sparse Learning, in Proc. of the 34th AAAI Conference on Artificial Intelligence (**AAAI'20**), New York, New York, USA, 2020.
54. Tao Jin*, Pan Xu*, **Quanquan Gu** and Farzad Farnoud, Rank Aggregation via Heterogeneous Thurstone Preference Models, in Proc. of the 34th AAAI Conference on Artificial Intelligence (**AAAI'20**), New York, New York, USA, 2020. Oral presentation
55. Difan Zou, Pan Xu, **Quanquan Gu**, Stochastic Gradient Hamiltonian Monte Carlo Methods with Recursive Variance Reduction, In Proc. of Advances in Neural Information Processing Systems (**NeurIPS'19**) 32, Vancouver, Canada, 2019.
56. Difan Zou, **Quanquan Gu**, An Improved Analysis of Training Over-parameterized Deep Neural Networks, In Proc. of Advances in Neural Information Processing Systems (**NeurIPS'19**) 32, Vancouver, Canada, 2019.
57. Difan Zou*, Ziniu Hu*, Yewen Wang, Song Jiang, Yizhou Sun, **Quanquan Gu**, Layer-Dependent Importance Sampling for Training Deep and Large Graph Convolutional Networks, In Proc. of Advances in Neural Information Processing Systems (**NeurIPS'19**) 32, Vancouver, Canada, 2019.
58. Yuan Cao, **Quanquan Gu**, Generalization Bounds of Stochastic Gradient Descent for Wide and Deep Neural Networks, In Proc. of Advances in Neural Information Processing Systems (**NeurIPS'19**) 32, Vancouver, Canada, 2019. (Spotlight Presentation)
59. Yuan Cao, **Quanquan Gu**, Tight Sample Complexity of Learning One-hidden-layer Convolutional Neural Networks, In Proc. of Advances in Neural Information Processing Systems (**NeurIPS'19**) 32, Vancouver, Canada, 2019.
60. Spencer Frei, Yuan Cao, **Quanquan Gu**, Algorithm-Dependent Generalization Bounds for Overparameterized Deep Residual Networks, In Proc. of Advances in Neural Information Processing Systems (**NeurIPS'19**) 32, Vancouver, Canada, 2019.
61. Difan Zou*, Yuan Cao*, Dongruo Zhou and **Quanquan Gu**, Gradient Descent Optimizes Over-parameterized Deep ReLU Networks, Machine Learning Journal (**MLJ**), 2019.
62. Dongruo Zhou, Pan Xu and **Quanquan Gu**, Stochastic Variance-Reduced Cubic Regularized Newton Methods, Journal of Machine Learning Research (**JMLR**), 2019,
63. Pan Xu, Felicia Gao and **Quanquan Gu**, An Improved Convergence Analysis of Stochastic Variance-Reduced Policy Gradient, in Proc. of the 35th International

- Conference on Uncertainty in Artificial Intelligence (**UAI'19**), Tel Aviv, Israel, 2019.
64. Lingxiao Wang and **Quanquan Gu**, Differentially Private Iterative Gradient Hard Thresholding for Sparse Learning, in Proc. of the 28th International Joint Conference on Artificial Intelligence (**IJCAI'19**), Macao, China , 2019.
 65. Dongruo Zhou, **Quanquan Gu**, Lower Bounds for Smooth Nonconvex Finite-Sum Optimization, in Proc. of the 36th International Conference on Machine Learning (**ICML'19**), Long Beach, CA, USA, 2019.
 66. Yisen Wang, Xingjun Ma, James Bailey, Jinfeng Yi, Bowen Zhou, **Quanquan Gu**, On the Convergence and Robustness of Adversarial Training, in Proc. of the 36th International Conference on Machine Learning (**ICML'19**), Long Beach, CA, USA, 2019.
 67. Xiao Zhang*, Yaodong Yu*, Lingxiao Wang* and **Quanquan Gu**, Learning One-hidden-layer ReLU Networks via Gradient Descent, In Proc. of the 22nd International Conference on Artificial Intelligence and Statistics (**AISTATS'19**), Naha, Okinawa, Japan, 2019.
 68. Difan Zou, Pan Xu and **Quanquan Gu**, Sampling from Non-Log-Concave Distributions via Variance-Reduced Gradient Langevin Dynamics, In Proc. of the 22nd International Conference on Artificial Intelligence and Statistics (**AISTATS'19**), Naha, Okinawa, Japan, 2019.
 69. Dongruo Zhou, Pan Xu and **Quanquan Gu**, Stochastic Nested Variance Reduction for Nonconvex Optimization, In Proc. of Advances in Neural Information Processing Systems (**NeurIPS'18**) 31, Montreal, Canada, 2018. Spotlight
 70. Pan Xu*, Jinghui Chen*, Difan Zou and **Quanquan Gu**, Global Convergence of Langevin Dynamics Based Algorithms for Nonconvex Optimization, In Proc. of Advances in Neural Information Processing Systems (**NeurIPS'18**) 31, Montreal, Canada, 2018. Spotlight
 71. Yaodong Yu*, Pan Xu* and **Quanquan Gu**, Third-order Smoothness Helps: Even Faster Stochastic Optimization Algorithms for Finding Local Minima, In Proc. of Advances in Neural Information Processing Systems (**NeurIPS'18**) 31, Montreal, Canada, 2018.
 72. Bargav Jayaraman, Lingxiao Wang, David Evans and **Quanquan Gu**, Distributed Learning without Distress: Privacy-Preserving Empirical Risk Minimization, In Proc. of Advances in Neural Information Processing Systems (**NeurIPS'18**) 31, Montreal, Canada, 2018.
 73. Yang Wang, **Quanquan Gu** and Donald Brown, Differentially Private Hypothesis Transfer Learning, In Proc. of 28th European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (**ECML/PKDD'18**), Dublin, Ireland, 2018.
 74. Wenjun Jiang, Qi Li, Lu Su, Chenglin Miao, **Quanquan Gu**, Wenyao Xu: Towards Personalized Learning in Mobile Sensing Systems. In Proc. of 38th IEEE International Conference on Distributed Computing Systems (**ICDCS'18**), Vienna, Austria, pp.321-333, 2018.
 75. Yang Yang, **Quanquan Gu**, Takayo Sasaki, Rachel O'neill, David Gilbert and Jian Ma, Continuous-trait probabilistic model for comparing multi-species functional genomic data, Cell Systems, in press, 2018.
 76. Difan Zou*, Pan Xu* and **Quanquan Gu**, Subsampled Stochastic Variance-Reduced Gradient Langevin Dynamics, in Proc. of the 34th International Conference on Uncertainty in Artificial Intelligence (**UAI'18**), Monterey, California, 2018.
 77. Xiao Zhang*, Simon S. Du* and **Quanquan Gu**, Fast and Sample Efficient Inductive Matrix Completion via Multi-Phase Procrustes Flow, in Proc. of the 35th International Conference on Machine Learning (**ICML'18**), Stockholm, Sweden, 2018.
 78. Xiao Zhang*, Lingxiao Wang*, Yaodong Yu and **Quanquan Gu**, A Primal-Dual Analysis of Global Optimality in Nonconvex Low-Rank Matrix Recovery, in Proc. of the 35th International Conference on Machine Learning (**ICML'18**), Stockholm,

- Sweden, 2018.
79. Difan Zou*, Pan Xu* and **Quanquan Gu**, Stochastic Variance-Reduced Hamilton Monte Carlo Methods, in Proc. of the 35th International Conference on Machine Learning (**ICML'18**), Stockholm, Sweden, 2018.
 80. Jinghui Chen, Pan Xu, Lingxiao Wang, Jian Ma and **Quanquan Gu**, Covariate Adjusted Precision Matrix Estimation via Nonconvex Optimization, in Proc. of the 35th International Conference on Machine Learning (**ICML'18**), Stockholm, Sweden, 2018.
 81. Pan Xu* and Tianhao Wang* and **Quanquan Gu**, Continuous and Discrete-Time Accelerated Stochastic Mirror Descent for Strongly Convex Functions, in Proc. of the 35th International Conference on Machine Learning (**ICML'18**), Stockholm, Sweden, 2018.
 82. Dongruo Zhou, Pan Xu and **Quanquan Gu**, Stochastic Variance-Reduced Cubic Regularized Newton Method, in Proc. of the 35th International Conference on Machine Learning (**ICML'18**), Stockholm, Sweden, 2018.
 83. Pan Xu* and Tianhao Wang* and **Quanquan Gu**, Accelerated Stochastic Mirror Descent: From Continuous-time Dynamics to Discrete-time Algorithms, in Proc of the 21st International Conference on Artificial Intelligence and Statistics (**AISTATS'18**), Playa Blanca, Lanzarote, Canary Islands, 2018.
 84. Xiao Zhang* and Lingxiao Wang* and **Quanquan Gu**, A Unified Framework for Nonconvex Low-Rank plus Sparse Matrix Recovery, in Proc of the 21st International Conference on Artificial Intelligence and Statistics (**AISTATS'18**), Playa Blanca, Lanzarote, Canary Islands, 2018.
 85. Yang Yang, **Quanquan Gu**, Takayo Sasaki, Rachel O'neill, David Gilbert and Jian Ma, Continuous-trait Probabilistic Model for Comparing Multi-species Functional Genomic Data, in Proc. of the 22nd Annual International Conference on Research in Computational Molecular Biology (**RECOMB'18**), 2018.
 86. Pan Xu and Jian Ma and **Quanquan Gu**, Speeding Up Latent Variable Gaussian Graphical Model Estimation via Nonconvex Optimization, In Proc. of Advances in Neural Information Processing Systems (**NIPS'17**) 30, Long Beach, CA, USA, 2017.
 87. Jinghui Chen and **Quanquan Gu**, Fast Newton Hard Thresholding Pursuit for Sparsity Constrained Nonconvex Optimization, in Proc of the 23rd ACM SIGKDD Conference on Knowledge Discovery and Data Mining (**KDD'17**), Halifax, Nova Scotia, Canada, 2017.
 88. Aditya Chaudhry, Pan Xu and **Quanquan Gu**, Uncertainty Assessment and False Discovery Rate Control in High-Dimensional Granger Causal Inference, in Proc. of the 34th International Conference on Machine Learning (**ICML'17**), Sydney, Australia, 2017.
 89. Rongda Zhu, Lingxiao Wang, Chengxiang Zhai, **Quanquan Gu**, Variance-Reduced Stochastic Gradient High-Dimensional Expectation Maximization Algorithm, in Proc. of the 34th International Conference on Machine Learning (**ICML'17**), Sydney, Australia, 2017.
 90. Lingxiao Wang*, Xiao Zhang*, **Quanquan Gu**, A Unified Variance-Reduction Based Framework for Nonconvex Low-Rank Matrix Recovery, in Proc. of the 34th International Conference on Machine Learning (**ICML'17**), Sydney, Australia, 2017.
(*: equal contribution)
 91. Lingxiao Wang, **Quanquan Gu**, Robust Gaussian Graphical Model Estimation with Arbitrary Corruption, in Proc. of the 34th International Conference on Machine Learning (**ICML'17**), Sydney, Australia, 2017.
 92. Lu Tian and **Quanquan Gu**, Communication-efficient Distributed Sparse Linear Discriminant Analysis, in Proc of the 20th International Conference on Artificial Intelligence and Statistics (**AISTATS'17**), Fort Lauderdale, Florida, USA, 2017.
 93. Lingxiao Wang* and Xiao Zhang* and **Quanquan Gu**, A Unified Computational and Statistical Framework for Nonconvex Low-Rank Matrix Estimation, in Proc of the

- 20th International Conference on Artificial Intelligence and Statistics (**AISTATS'17**), Fort Lauderdale, Florida, USA, 2017. (*: equal contribution)
94. Pan Xu and Tingting Zhang and **Quanquan Gu**, Efficient Algorithm for Sparse Tensor-variate Gaussian Graphical Models via Gradient Descent, in Proc of the 20th International Conference on Artificial Intelligence and Statistics (**AISTATS'17**), Fort Lauderdale, Florida, USA, 2017.
 95. Dezhi Hong and **Quanquan Gu** and Kamin Whitehouse, High-dimensional Time Series Clustering via Cross-Predictability, in Proc of the 20th International Conference on Artificial Intelligence and Statistics (**AISTATS'17**), Fort Lauderdale, Florida, USA, pp.642-651, 2017.
 96. Pan Xu and **Quanquan Gu**, Semiparametric Differential Graph Models, In Proc. of Advances in Neural Information Processing Systems (**NIPS'16**) 29, Barcelona, Spain, pp.1064-1072, 2016.
 97. Lu Tian*, Bargav Jayaraman*, **Quanquan Gu**, David Evans, Aggregating Private Sparse Learning Models Using Multi-Party Computation, NIPS Workshop on Private Multi-Party Machine Learning, Barcelona, Spain, 2016. (*: equal contribution)
 98. Dechao Tian, **Quanquan Gu**, and Jian Ma. Identifying gene regulatory network rewiring using latent differential graphical models. Nucleic Acids Research, 2016.
 99. Jinghui Chen and **Quanquan Gu**, Accelerated Stochastic Block Coordinate Gradient Descent for Sparsity Constrained Nonconvex Optimization, in Proc of the 32th International Conference on Uncertainty in Artificial Intelligence (**UAI'16**), New York/New Jersey, USA, 2016.
 100. Lu Tian, Pan Xu and **Quanquan Gu**, Forward Backward Greedy Algorithms for Multi-Task Learning with Faster Rates, in Proc of the 32th International Conference on Uncertainty in Artificial Intelligence (**UAI'16**), New York/New Jersey, USA, 2016.
 101. Huan Gui, Jiawei Han and **Quanquan Gu**, Towards Faster Rates and Oracle Property for Low-Rank Matrix Estimation, in Proc. of the 33th International Conference on Machine Learning (**ICML'16**), New York, USA, pp.2300-2309, 2016.
 102. Zhaoran Wang, **Quanquan Gu**, and Han Liu, Statistical Limits of Convex Relaxations, in Proc. of the 33th International Conference on Machine Learning (**ICML'16**), New York, USA, pp.1368-1377, 2016.
 103. Qingyun Wu, Huazheng Wang, **Quanquan Gu** and Hongning Wang. Contextual Bandits in A Collaborative Environment. The 39th International ACM SIGIR Conference on Research and Development in Information Retrieval (**SIGIR'16**), Pisa, Tuscany, Italy, pp.529-538, 2016.
 104. **Quanquan Gu** and Zhaoran Wang and Han Liu, Low-Rank and Sparse Structure Pursuit via Alternating Minimization, in Proc of the 19th International Conference on Artificial Intelligence and Statistics (**AISTATS'16**), Cadiz, Spain, pp.600-609, 2016.
 105. Lingxiao Wang, Xiang Ren and **Quanquan Gu**, Precision Matrix Estimation in High Dimensional Gaussian Graphical Models with Faster Rates, in Proc of the 19th International Conference on Artificial Intelligence and Statistics (**AISTATS'16**), Cadiz, Spain, pp.177-185, 2016.
 106. Renkun Ni and **Quanquan Gu**, Optimal Statistical and Computational Rates for One Bit Matrix Completion, in Proc of the 19th International Conference on Artificial Intelligence and Statistics (**AISTATS'16**), Cadiz, Spain, pp.426-434, 2016.
 107. Zhaoran Wang and **Quanquan Gu** and Han Liu, Sharp Computational-Statistical Phase Transitions via Oracle Computational Model, arXiv:1512.08861, 2015.
 108. Haiping Wang, **Quanquan Gu**, Jia Wei, Zhiwei Cao and Qi Liu, Mining drug-disease relationships as a complement to medical genetics-based drug repositioning: Where a recommendation system meets genome-wide association studies, Clinical Pharmacology & Therapeutics, pp.451-454, 2015.
 109. Zhaoran Wang, **Quanquan Gu**, Yang Ning, and Han Liu, High Dimensional Expectation-Maximization Algorithm: Statistical Optimization and Asymptotic

- Normality, In Proc. of Advances in Neural Information Processing Systems (**NIPS'15**) 28, Montreal, Quebec, Canada, pp. 2521-2529, 2015.
110. Chang Wan, Ben Kao, Xiao Yu, **Quanquan Gu**, David W.L Cheung, Jiawei Han, Classification with Active Learning and Meta-paths in Heterogeneous Information Networks, In Proc of the 24th ACM Conference on Information and Knowledge Management (**CIKM'15**), Melbourne, VIC, Australia, pp.443-452, 2015.
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INVITED TALKS

1. “On the Convergence of Monte Carlo Methods with Stochastic Gradients”, Simons Institute Workshop on Sampling Algorithms and Geometries on Probability Distributions, Oct, 2021
2. “Stochastic Variance-Reduced High-order Optimization for Nonconvex Optimization”, ICML 2021 Workshop on Beyond first order methods in machine learning systems, July, 2021
3. “Epidemic Model Guided Machine Learning for COVID-19 Forecasts”, ICLR 2021 Workshop on Machine Learning for Preventing and Combating Pandemics, May, 2021
4. “On the Implicit Bias of Stochastic Gradient Descent with Moderate Learning Rate”, UCSD Halcioglu Data Science Institute Seminar, April, 2021
5. “Stochastic Variance-Reduced Cubic Regularized Newton Methods for Nonconvex Optimization”, SIAM CSE Mini-symposium on beyond first-order algorithms in modern machine learning systems, March, 2021
6. “Understanding Overparameterized Deep Neural Networks: From Optimization To Generalization”, IJCAI Early Career Talk, January 2021
7. “Epidemic Model Guided Machine Learning for COVID-19 Forecas”, Center for Interdisciplinary Scientific Computation Seminar at Illinois Tech, November, 2020
8. “Learning Wide Neural Networks: Polylogarithmic Over-parameterization and A Mean Field Perspective”, Northwestern University IDEAL Theory of Deep Learning Seminar, October, 2020
9. “Epidemic Model Guided Machine Learning for COVID-19 Forecast”, UCSB Second Annual Responsible Machine Learning Summit, October, 2020
10. “Understanding, Improving and Evaluating Adversarial Robustness in Deep Learning”, Johns Hopkins University Machine Learning Seminar, September, 2020
11. “A Generalized Neural Tangent Kernel Analysis for Two-layer Neural Networks”, Simons Institute Deep Learning Reunion Workshop, August, 2020
12. “Understanding, Improving and Evaluating Adversarial Robustness in Deep Learning”, KDD 2020 Workshop on Adversarial Learning Methods for Machine Learning and Data Mining, August, 2020
13. “Epidemic Model Guided Machine Learning for COVID-19 Forecast”, 2020 KDD Workshop on Applied Data Science for Healthcare, August, 2020
14. “Epidemic Model Guided Machine Learning for COVID-19 Forecast”, D. E. Shaw Technical Talk Forum, June, 2020
15. “Epidemic Model Guided Machine Learning for COVID-19 Forecast”, Institute for Digital Research and Education (IDRE), June, 2020
16. “Epidemic Model Guided Machine Learning for COVID-19 Forecast”, UCLA Computer Science Department Seminar, May, 2020
17. “Epidemic Model Guided Machine Learning for COVID-19 Forecast”, AI for COVID-19 in LA Symposium, May, 2020
18. “Learning Over-parameterized Neural Networks: From Neural Tangent Kernel to Mean-field Analysis”, IPAM Workshop on PDE and Inverse Problem Methods in Machine Learning, April, 2020
19. “Learning Over-parameterized Neural Networks: From Neural Tangent Kernel to

- Mean-field Analysis”, UCSD AI Seminar, February, 2020
20. “On the Optimization and Generalization of Neural Networks: A Mean-Field Perspective”, Information Theory and Applications Workshop, February, 2020
 21. “Towards Understanding Overparameterized Deep Neural Networks: From Optimization To Generalization”, TTIC Workshop on “Recent Trends in Clustering and Classification”, September 2019.
 22. “Two facets of stochastic optimization: continuous-time dynamics and discrete-time algorithms”, Workshop on “Interplay between Control, Optimization, and Machine Learnin” at American Control Conference, July 2019.
 23. “Towards Understanding Overparameterized Deep Neural Networks: From Optimization To Generalization”, Machine Learning Theory Workshop at Peking University, June 2019.
 24. “Towards Understanding Overparameterized Deep Neural Networks: From Optimization To Generalization”, Statistics Department Colloquium, University of California, Los Angeles, April 2019.
 25. “New Variance Reduction Algorithms for Nonconvex Finite-Sum Optimization”, Machine Learning Seminar, University of Southern California, Nov 2018.
 26. “Closing the Generalization Gap of Adaptive Gradient Methods in Training Deep Neural Networks: Algorithms and Theory”, AI Seminar, USC Information Science Institute, Nov 2018.
 27. “The Power and Promise of Nonconvex Optimization for Machine Learning”, School of Electrical and Computer Engineering, Cornell University, March 2018.
 28. “The Power and Promise of Nonconvex Optimization for Machine Learning”, School of Computational Science and Engineering, Georgia Institute of Technology, March 2018.
 29. “Two Facets of Stochastic Optimization: Continuous-time Dynamics and Discrete-time Algorithms”, Machine Learning Department, Carnegie Mellon University, Sep 2017.
 30. “Blessing of Nonconvexity: Nonconvex Statistical Learning Methods”, University of Virginia, Quantitative Psychology Lecture Series, Feb 2017.
 31. “Blessing of Nonconvexity: Nonconvex Statistical Learning Methods”, Virginia Tech (NVC), CS Seminar, Oct 2016.
 32. “Blessing of Nonconvexity: Nonconvex Statistical Learning Methods”, University of Virginia, SIE Colloquium, Sep 2016.
 33. “Blessing of Nonconvexity: Nonconvex Statistical Learning Methods”, University of Virginia, CS Seminar, Sep 2016.
 34. “Distributed Inference for High Dimensional Semi-parametric Elliptical Graphical Models”, ENAR Spring Meeting, Austin, Texas, March 2016.
 35. “On Longitudinal Gaussian Graphical Models: Estimation and Asymptotic Inference”, ENAR Spring Meeting, Austin, Texas, March 2016
 36. “Asymptotic Inference for High Dimensional Gaussian Copula Graphical Models”, University of Virginia, Statistics Colloquium, Feb 2016.
 37. “Local and Global Inference for High-Dimensional Gaussian Copula Graphical Models”, Joint Statistical Meetings, Seattle, Aug 2015.
 38. “Big Network Analytics: Online and Active Learning Approaches” Michigan State University, CS Colloquium, March 2014.
 39. “Big Network Analytics: Online and Active Learning Approaches”, University of Oregon, CIS Colloquium, March 2014.
 40. “Big Network Analytics: Online and Active Learning Approaches”, University of Utah, CS Colloquium, March 2014.
 41. “Big Network Analytics: Online and Active Learning Approaches”, University of Virginia, SIE Colloquium, Feb 2014.
 42. “Big Network Analytics: Online and Active Learning Approaches”, University of Illinois at Urbana-Champaign, AIIS Seminar, Feb 2014.

43. “Big Network Analytics: Online and Active Learning Approaches”, University of Illinois at Urbana-Champaign, DAIS Seminar, Feb 2014.
44. “Selective Labeling via Error Bound Minimization”, University of Illinois at Urbana-Champaign, DAIS Seminar, Oct 2012.

RESEARCH GRANTS

- Co-PI: National Science Foundation (NSF) (Award #2140762) “EAGER: ADAPT: AI-based Categorization to Decipher Reaction Mechanisms from Cyclic Voltammetry”, Total award amount: \$299,999.00, Duration: 9/01/21 - 08/31/23, My share: 50%.
- Single PI: National Science Foundation (NSF) (Award #2008981) “III: Small: Towards the Foundations of Training Deep Neural Networks: New Theory and Algorithms”, Total award amount: \$500,000.00, Duration: 10/01/20 - 09/30/23.
- Lead PI: National Science Foundation (NSF) (Award #1911168) “CIF: Small: Collaborative Research: Rank Aggregation with Heterogeneous Information Sources: Efficient Algorithms and Fundamental Limits” with UVa PI Farzad Farnoud, Total award amount: \$500,000.00, Duration: 10/01/2019-9/30/2022, My share: 50%.
- Lead PI: National Science Foundation (NSF) (Award #1741342/#1855099) “BIG-DATA: F: Collaborative Research: Taming Big Networks via Embedding” with Co-PI Jiawei Han, Total award amount: \$900,000.00, Duration: 01/01/2018-12/31/2021, My share: 55%.
- PI: National Science Foundation (NSF) (Award #1717950) “SaTC: CORE: Small: Multi-Party High-dimensional Machine Learning with Privacy” with Co-PI David Evans, Total award amount: \$498,624.00, Duration: 08/01/2017-07/31/2020, My share: 50%. (Switched to Co-PI after I moved to UCLA in 2018.)
- Lead PI: National Science Foundation (NSF) (Award #1717206/#1903202) “III: Small: Collaborative Research: High-Dimensional Machine Learning Methods for Personalized Cancer Genomics” with Co-PI Jian Ma, Total award amount: \$500,000, Duration: 08/01/2017-07/31/2020, My share: 60%.
- Single PI: National Science Foundation (NSF) (Award #1652539/#1906169) “CA-REER: Scaling Up Knowledge Discovery in High-Dimensional Data via Nonconvex Statistical Optimization”, Total award amount: \$515,835.00, Duration: 2017/8/1-2022/7/31.
- PI: National Science Foundation (NSF) (Award #1618948/#1904183) “III: Small: Collaborative Learning with Incomplete and Noisy Knowledge” with Co-PI Hongning Wang, Total award amount: \$500,000, Duration: 2016/8/1-2019/7/31, My share: 50%.
- PI: UVa SEAS Cyber-security Initiative Award “Multi-party Machine Learning with Privacy” with David Evans (Co-PI). Total award amount: \$75,000 (2016-2017). My share: 50%.
- Co-PI: UVa SEAS Research Innovation Award “Machine Learning in Adversarial Contexts” with David Evans (PI), Homa Alemzadeh, Mohammad Mahmoody, Yanjun Qi. (2017-2018)
- Co-PI: UVa SEAS Research Innovation Award “Robust Data Fusion in Dynamic Environments” with Farzad Hassanzadeh (PI). (2017-2018)
- Co-PI: UVa Brain Institute Transformative, Collaborative Neuroscience Pilot Grant “SysNimDB: a public resource for characterizing neuroimmunological cell types and disease states in heterogeneous transcriptomic datasets” with Chris Overall (PI), Yanjun Qi and Abigail Flower. Total award amount: \$75,000 (2017-2018).

PROFESSIONAL SERVICES

- Editorial Board Member
 - Artificial Intelligence Journal
 - Information Processing and Management

- Pattern Recognition and Artificial Intelligence
- Associate Editor/Section Editor
 - Journal of Artificial Intelligence Research
 - PLOS ONE
- Journal Reviewer for
 - IEEE Transaction on Pattern Analysis and Machine Intelligence
 - IEEE Transaction on Knowledge and Data Engineering
 - IEEE Transactions on Neural Networks and Learning Systems
 - IEEE Transaction on Systems, Man and Cybernetics - Part B
 - IEEE Transaction on Cybernetics
 - ACM Transaction on Knowledge Discovery from Data
 - Journal of Machine Learning Research
 - Machine Learning
 - Statistica Sinica
 - Data Mining and Knowledge Discovery
 - Information Processing and Management
 - Neurocomputing
 - Computer Vision and Image Understanding
 - Artificial Intelligence
 - Knowledge and Information Systems
 - PLOS ONE
 - Journal of Mathematical Imaging and Vision
 - Multimedia Systems
 - Computational Intelligence
- PC Chair/PC Vice-Chair for
 - IEEE International Conference on Big Data (ICBD) 2019
- Area Chair
 - International Conference on Machine Learning (ICML) 2019, 2020, 2021
 - Annual Conference on Neural Information Processing Systems (NeurIPS) 2019, 2021
 - AAAI Conference on Artificial Intelligence (AAAI) 2020, 2021
 - International Conference on Learning Representations (ICLR) 2020, 2021, 2022
 - International Conference on Data Mining (ICDM), 2021
- Senior PC Member for
 - International Joint Conferences on Artificial Intelligence (IJCAI) 2019, 2020, 2021
 - Asian Conference on Machine Learning (ACML) 2019
- PC Member for
 - International Conference on Machine Learning (ICML) 2015, 2016, 2017, 2018
 - International Conference on Artificial Intelligence and Statistics (AISTATS) 2015, 2016, 2017, 2018, 2019, 2020
 - International Conference on Uncertainty in Artificial Intelligence (UAI) 2016, 2017, 2018, 2019
 - ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (KDD) 2015, 2016, 2017, 2018, 2019
 - World Wide Web (WWW) Conference 2017, 2018
 - Very Large Data Bases (VLDB) Conferences 2017, 2018, 2019
 - SIAM Conference on Data Mining (SDM) 2017, 2018
 - International Joint Conferences on Artificial Intelligence (IJCAI) 2013, 2015, 2016, 2017
 - AAAI Conference on Artificial Intelligence (AAAI) 2018, 2019
 - International Conference on Learning Representations (ICLR) 2018, 2019
 - Asian Conference on Machine Learning (ACML) 2012
 - Natural Language Processing and Chinese Computing 2015
- Reviewer for

- Annual Conference on Neural Information Processing Systems (NIPS) 2014, 2015, 2016, 2017, 2018
- Conference on Learning Theory (COLT) 2018, 2019
- Section Chair for
 - International Conference on Machine Learning (ICML) 2019, 2021
 - Conference on Learning Theory (COLT) 2021
 - ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (KDD) 2016
 - ENAR Spring Meeting 2016
- Grant Proposal Review:
 - NSF III, Panelist, 2017
 - NSF RI, Panelist, 2017
 - NSF III, Panelist, 2018
 - NSF III, Panelist, 2019
 - NSF CIF, SBIR, Panelist, 2020
 - NSF SBIR, Panelist, 2021

REFERENCES

Available upon request.