

Lei, Qi

Website: <https://cecilialeiqi.github.io/>

Google Scholar: <https://scholar.google.com/citations?user=kG0gaowAAAAJ&hl=en>

Email: qilei@princeton.edu

Education	<i>University of Texas at Austin, TX, United States</i> August 2014 - May 2020 <ul style="list-style-type: none">• <i>Ph.D., Oden Institute for Computational Sciences and Engineering</i>• Advisors: Alexandros G. Dimakis and Inderjit S. Dhillon
	<i>Zhejiang University, Zhejiang, China</i> Sep 2010 - June 2014 <ul style="list-style-type: none">• <i>B.S., School of Mathematics (with honors)</i> (GPA 3.92/4.0, rank 1st)
Research Interests	My research aims to bridge the theoretical and empirical boundary of modern machine learning algorithms, with a focus on large-scale optimization and representation/transfer learning.
Professional Experience	<i>Princeton University, NJ, United States</i> July 2020 - Present <ul style="list-style-type: none">• <i>Associate Research Scholar (CIFellow)</i>, Electrical and Computer Engineering Department September 2021 - Present• <i>Postdoc Research Associate (CIFellow)</i>, Electrical and Computer Engineering Department July 2020 - September 2021• Mentor: Jason D. Lee
	<i>Institute for Advanced Study, Princeton, NJ, United States</i> September 2019 - July 2020 <ul style="list-style-type: none">• Visiting Graduate Student for the “Special Year on Optimization, Statistics, and Theoretical Machine Learning”
	<i>Simons Institute, Berkeley, CA, United States</i> May 2019 - August 2019 <ul style="list-style-type: none">• Research Fellow for the Foundations of Deep Learning Program
Awards and Recognitions	<ul style="list-style-type: none">• Computing Innovation Fellowship (\$150k) CRA, 2020-2022• Simons-Berkeley Research Fellowship Simons Institute, 2019• The National Initiative for Modeling and Simulation Research Fellowship (\$225k) UT Austin, 2014-2018• Young Investigators Lecturer award Caltech, 2021• Outstanding Dissertation Award Oden Institute, 2020• Dissertation Writing Fellowship UT Austin, 2021• Rising Star for Machine Learning University of Maryland, 2021• Rising Star for EECS UIUC, 2019 & MIT, 2021• Rising Star for Computational and Data Science UT Austin, 2020• The Excellence Scholarship (top honor) Zhejiang Univ, 2014
Thesis	Qi Lei , “Provably effective algorithms for min-max optimization” May 2020 <i>Received the 2021 Outstanding Dissertation Award, Oden Institute</i>

Publications

(* indicates

α - β order)

1. Jason D. Lee*, **Qi Lei***, Nikunj Saunshi*, Jiacheng Zhuo*, “Predicting What You Already Know Helps: Provable Self-Supervised Learning”, *to appear at NeurIPS 2021*
2. Baihe Huang*, Kaixuan Huang*, Sham M. Kakade*, Jason D. Lee*, **Qi Lei***, Runzhe Wang*, Jiaqi Yang*, “Optimal Gradient-based Algorithms for Non-concave Bandit Optimization”, *to appear at NeurIPS 2021*
3. Kurtland Chua, **Qi Lei**, Jason D. Lee. “How Fine-Tuning Allows for Effective Meta-Learning”, *to appear at NeurIPS 2021*
4. Baihe Huang*, Kaixuan Huang*, Sham M. Kakade*, Jason D. Lee*, **Qi Lei***, Runzhe Wang*, Jiaqi Yang*, “Going Beyond Linear RL: Sample Efficient Neural Function Approximation”, *to appear at NeurIPS 2021*
5. **Qi Lei**, Wei Hu, Jason D. Lee. “Near-Optimal Linear Regression under Distribution Shift”, *International Conference of Machine Learning (ICML), 2021: 6164-6174*
6. Tianle Cai*, Ruiqi Gao*, Jason D Lee*, **Qi Lei***. “A Theory of Label Propagation for Subpopulation Shift”, *International Conference of Machine Learning (ICML), 2021: 1170-1182*
7. Jay Whang, **Qi Lei**, Alexandros G. Dimakis. “Solving Inverse Problems with a Flow-based Noise Model”, *International Conference of Machine Learning (ICML), 2021: 11146-11157*
8. Simon S. Du*, Wei Hu*, Sham M. Kakade*, Jason D. Lee*, **Qi Lei***. “Few-Shot Learning via Learning the Representation, Provably”, *International Conference on Learning Representations, 2021*
9. **Qi Lei***, Sai Ganesh Nagarajan*, Ioannis Panageas*, Xiao Wang*. “Last iterate convergence in no-regret learning: constrained min-max optimization for convex-concave landscapes”, *International Conference on Artificial Intelligence and Statistics, 2021: 1441-1449*
10. Xiao Wang, **Qi Lei**, Ioannis Panageas. “Fast Convergence of Langevin Dynamics on Manifold: Geodesics meet Log-Sobolev”, *Proc. of Neural Information Processing Systems (NeurIPS), 2020*
11. Jiacheng Zhuo, **Qi Lei**, Alexandros G. Dimakis, Constantine Caramanis. “Communication-Efficient Asynchronous Stochastic Frank-Wolfe over Nuclear-norm Ball”, *The 23rd International Conference on Artificial Intelligence and Statistics, 2020: 1464-1474*
12. **Qi Lei**, Jason Lee, Alexandros G. Dimakis, Contantinos Daskalakis. “SGD Learns One-Layer Networks in WGANs”, *International Conference of Machine Learning (ICML), 2020: 5799-5808*
13. **Qi Lei**, Jiacheng Zhuo, Constantine Caramanis, Inderjit S. Dhillon, Alexandros G. Dimakis. “Primal-Dual Block Generalized Frank-Wolfe”, *Proc. of Neural Information Processing Systems (NeurIPS), 2019: 13866-13875*
14. **Qi Lei**, Ajil Jalal, Inderjit S. Dhillon, Alexandros G. Dimakis. “Inverting Deep Generative models, One layer at a time”, *Proc. of Neural Information Processing Systems (NeurIPS), 2019: 13910-13919*
15. **Qi Lei**, Jinfeng Yi, Roman Vaculin, Lingfei Wu, Inderjit S. Dhillon. “Similarity Preserving Representation Learning for Time Series Analysis”, *The 28th International Joint Conference on Artificial Intelligence (IJCAI), 2019: 2845-2851*

16. **Qi Lei**, Lingfei Wu, Pin-Yu Chen, Alexandros G. Dimakis, Inderjit S. Dhillon, Michael Witbrock. “Discrete Adversarial Attacks and Submodular Optimization with Applications to Text Classification”, *Systems and Machine Learning (MLsys)*, 2019 (covered by Nature News)
17. Jinfeng Yi, **Qi Lei**, Wesley M Gifford, Ji Liu, Junchi Yan, Bowen Zhou. “Fast Unsupervised Location Category Inference from Highly Inaccurate Mobility Data”, *Proceedings of the 2019 SIAM International Conference on Data Mining 2019*: 55-63
18. Zhewei Yao, Amir Gholami, **Qi Lei**, Kurt Keutzer, Michael W. Mahoney. “Hessian-based Analysis of Large Batch Training and Robustness to Adversaries”, *Neural Information Processing Systems (NIPS)*, 2018: 4954-4964
19. Jiong Zhang, **Qi Lei**, Inderjit S. Dhillon. “Stabilizing Gradients for Deep Neural Networks via Efficient SVD Parameterization”, *International Conference of Machine Learning (ICML)*, 2018: 5801-5809
20. Jinfeng Yi, **Qi Lei**, Junchi Yan, Wei Sun. “Session expert: A lightweight conference session recommender system”, *IEEE International Conference on Big Data (Big Data)*, 2018: 1677-1682
21. Lingfei Wu, Ian En-Hsu Yen, Jinfeng Yi, Fangli Xu, **Qi Lei**, Michael Witbrock. “Random Warping Series: A Random Features Method for Time-Series Embedding”, *AISTATS 2018*: 793-802
22. Hsiang-fu Yu, Cho-Jui Hsieh, **Qi Lei**, Inderjit S. Dhillon. “A Greedy Approach for Budgeted Maximum Inner Product Search”, *Neural Information Processing Systems (NIPS)*, 2017: 5453-5462
23. **Qi Lei**, Enxu Yen, Chao-yuan Wu, Inderjit S. Dhillon, Pradeep Ravikumar. “Doubly Greedy Primal-Dual Coordinate Methods on Sparse Empirical Risk Minimization”, *International Conference of Machine Learning (ICML)*, 2017: 2034-2042
24. Rashish Tandon, **Qi Lei**, Alexandros G. Dimakis, Nikos Karampatziakis, “Gradient Coding: Avoiding Stragglers in Distributed Learning”, *International Conference of Machine Learning (ICML)*, 2017: 3368-3376
25. **Qi Lei**, Kai Zhong, Inderjit S. Dhillon. “Coordinate-wise Power Method”, *Neural Information Processing System(NIPS)*, 2016: 2056-2064
26. Arnaud Vandaele, Nicolas Gillis, **Qi Lei**, Kai Zhong, Inderjit S. Dhillon. “Coordinate Descent Methods for Symmetric Nonnegative Matrix Factorization”, *IEEE Transactions on Signal Processing*, 64.21 (2016): 5571-5584
27. Maria R. D’Orsogna, **Qi Lei**, Tom Chou, “First assembly times and equilibration in stochastic coagulation-fragmentation”, *The Journal of Chemical Physics*, 2015: 143.1, 014112
28. Jiazhou Chen, **Qi Lei**, Yongwei Miao, Qunsheng Peng, “Vectorization of Line Drawing Image based on Junction Analysis”, *Science China Information Sciences*, 2014:1-14
29. Jiazhou Chen, **Qi Lei**, Fan Zhong, Qunsheng Peng, “Interactive Tensor Field Design Based on Line Singularities”, *Proceedings of the 13th International CAD/Graphics*, 2013

Workshop Articles

1. Tianci Liu, Quan Zhang, **Qi Lei**, “PANOM: Automatic Hyper-parameter Tuning for Inverse Problems”, *to appear at NeurIPS 2021 Workshop on Deep Learning and Inverse Problems*
2. Kaixuan Huang*, Sham M. Kakade*, Jason D. Lee*, **Qi Lei***, “A Short Note on the Relationship of Information Gain and Eluder Dimension”, *ICML 2021 Workshop on Reinforcement Learning Theory*
3. Jason D. Lee*, **Qi Lei***, Nikunj Saunshi*, Jiacheng Zhuo*, “Predicting What You Already Know Helps: Provable Self-Supervised Learning”, *NeurIPS 2020 Workshop: Self-Supervised Learning - Theory and Practice*
4. Jay Whang, **Qi Lei**, Alex Dimakis, “Compressed Sensing with Invertible Generative Models and Dependent Noise”, *NeurIPS 2020 Workshop: Deep Learning and Inverse Problems*
5. **Qi Lei**, Ajil Jalal, Inderjit Dhillon, Alexandros Dimakis, “Inverting Deep Generative models, One layer at a time”, *ICML 2019 Workshop on Invertible Neural Networks and Normalizing Flows*
6. Rashish Tandon, **Qi Lei**, Alexandros G. Dimakis, Nikos Karampatziakis, “Gradient Coding”, *NIPS 2016 Workshop on ML Systems (MLSys)*

Under Review Preprints

1. Kurtland Chua, **Qi Lei**, Jason D Lee. “Provable Hierarchy-Based Meta-Reinforcement Learning”, *arXiv preprint*
2. Lemeng Wu, Mao Ye, **Qi Lei**, Jason D. Lee, and Qiang Liu. “Steepest Descent Neural Architecture Optimization: Escaping Local Optimum with Signed Neural Splitting”, *arXiv preprint*
3. Minhao Cheng, **Qi Lei**, Pin-Yu Chen, Inderjit Dhillon, Cho-Jui Hsieh. “CAT: Customized Adversarial Training for Improved Robustness”, *arXiv preprint*

Patents

- “Method and System for General and Efficient Time Series Representation Learning via Dynamic Time Warping.”
Q. Lei, J. Yi, R. Vaculin, and W. Sun
- “Real-Time Cold Start Recommendation and Rationale within a Dialog System”.
Q. Lei, J. Yi, R. Vaculin, M. Pietro

Teaching

- Department of Electrical and Computer Engineering, Princeton* Fall 2020
- Theory of Deep Learning: Representation and Weakly Supervised Learning: *Teaching Assistant*
- Department of Electrical and Computer Engineering, UT Austin* Fall 2019
- Scalable Machine Learning: *Teaching Assistant*
- Oden Institute for Computational Engineering and Sciences, UT Austin* Fall 2015
- Mathematical Methods in Applied Engineering and Sciences: *Instructor Intern*

Internships

- Facebook/Photo&Video Search* June 2018 - September 2018
- Explored offline/online evaluation gaps by estimating expected number of clicks based on historical logging data.
- Amazon/A9 Product Search* May 2017 - August 2017
- Inline search suggestions: used deep learning methods for NLP user search tasks.

Amazon Web Services (AWS Deep Learning Team) January 2017 - April 2017

- Documentations for MXNet: a deep learning framework designed for both efficiency and flexibility.

IBM Thomas J. Watson Research Center May 2016 - October 2016

- Partnered with one of the largest American financial companies on a challenge problem of predicting its clients' propensity of trading options
- Create World of Watson Session recommendation system:
<https://myibm.ibm.com/events/wow/watson/>

Service

Co-organizing Mathematical Data Science Reading Group, which is a weekly departmental seminar series on Machine Learning Theory in ECE, Princeton, 2020

Student mentor (for a female Ph.D. student), Oden Institute, 2018

Conference Reviewer: MLSys (19,20,Meta-reviewer'21, 22), COLT (21,22), STOC (20), NeurIPS (16,17,18,19,20,21), ICML (18,19,20,21), ICLR (18,19,20,21), AIS-TATS (18,19,20,21), AAAI (20,21), ACML (19), and more

Journal Reviewer: JSAIT(20), MOR (18,19,20), TNNLS (19,20), TKDE (19), ISIT (17,18), TIFS (17), IT (16,17), and more

Invited Talks

“Optimal Gradient-based Algorithms for Non-concave Bandit Optimization.”

- BLISS seminar, UC Berkeley, virtual 2021
- Sampling Algorithms and Geometries on Probability Distributions Workshop, Simons Institute, CA, 2021

“Few-Shot Learning via Learning the Representation, Provably.”

- International Conference on Learning Representations, virtual, 2021
- IAS, Princeton, NJ, 2020
- Simons Institute Reunion, virtual, 2020
- UC Berkeley, virtual, 2020

“Predicting What You Already Know Helps: Provable Self-Supervised Learning.”

- Proc. of Neural Information Processing Systems, virtual, 2021
- Institute for Foundations of Machine Learning, virtual, 2020
- One-World ML seminar, virtual, 2020
- UW-Madison, virtual, 2020

“Provable representation learning.”

- Young Researcher Spotlight Talk at “Seeking Low-dimensionality in Deep Learning” workshop, virtual, 2020
- Microsoft Research, virtual, 2021
- Caltech Young Investigators Lecture Series, virtual, 2021
- Rising star presentation at the University of Maryland, virtual, 2021
- ELLIS Talk at IST Austria, virtual, 2021
- CSIP seminar at Georgia Tech, virtual, 2021

“SGD Learns One-Layer Networks in WGANs.”

- International Conference of Machine Learning (ICML), virtual, 2020
- Workshop on Learning and Testing in High Dimensions, Simons Institute, 2020

“Deep Generative models and Inverse Problems.”

- Minisymposium on Machine Learning for Solving Partial Differential Equations and Inverse Problems, 2019 SIAM Texas-Louisiana Section, Dallas, TX, USA, 2019
- Princeton, virtual, 2020
- Google Research, virtual, 2021

“Similarity Preserving Representation Learning for Time Series Analysis.”

- The 28th International Joint Conference on Artificial Intelligence (IJCAI), Macao, 2019

“Discrete Adversarial Attacks and Submodular Optimization with Applications to Text Classification.”

- Simons-Berkeley Fellows Talk, Berkeley, CA, USA
- The Conference on Systems and Machine Learning (SysML), Stanford, CA, USA, 2019

“Recent Advances in Primal-Dual Coordinate Methods for ERM.”

- Minisymposium on Recent Progress in Coordinate-wise Descent Methods, SIAM Conference on Computational Science and Engineering, Spokane, WA, USA, 2019
- International Conference of Machine Learning (ICML), Sydney, 2017

“Coordinate Descent Methods for Matrix Factorization.”

- Minisymposium on Recent Advances in Nonnegative Matrix Factorization, SIAM Annual Meeting, Boston, USA, 2016