

Mahdi Soltanolkotabi

CONTACT INFORMATION

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RESEARCH INTERESTS

- Mathematical foundations of data science
- High-dimensional probability and statistics
- Mathematical optimization, signal processing and machine learning.
- Iterative algorithms and non-convex optimization
- Artificial intelligence for the basic sciences including computational imaging, microscopy, light-field sensing, and MRI imaging
- Theory of algorithms, applied probability, random matrix theory, empirical process theory and chaining, geometric functional analysis.
- Sparse/low-rank recovery, compressive sensing, and phase retrieval.
- Coded computing, edge computing, federated learning, low-precision computing, and large-scale data analytics over cloud infrastructure
- Machine learning for wireless and internet of things

ACADEMIC EMPLOYMENT

University of Southern California (USC), Los Angeles, CA.

- Andrew and Erna Viterbi Early Career Chair
Ming Hsieh Department of Electrical and Computer Engineering
August 2019-present.
- Assistant Professor
Ming Hsieh Department of Electrical and Computer Engineering
August 2015-present.
- Assistant Professor (by courtesy)
Department of Computer Science
January 2017-present.

University of California Berkeley (UCB), Berkeley, CA.

- Postdoctoral Researcher, Department of Electrical Engineering and Computer Science, August 2014-July 2015.
Mentors: Benjamin Recht and Martin Wainwright.

EDUCATION

Stanford University, Stanford, CA.

- PhD in Electrical Engineering, 2009-August 2014.
Advisor: Emmanuel J. Candès.
- M.Sc. in Electrical Engineering, Sept. 2009-June 2011.

Sharif University of Technology, Tehran, Iran.

- B.Sc. in Electrical Engineering, Sept. 2005-June 2009.

DISTINCTIONS

- 2019 Information Theory Society best paper award
- 2019 Sloan Fellowship in Mathematics
- 2018 Packard Fellowship in Science and Engineering
- NSF Career Award
- Air-force Office of Scientific Research 2018 Young Investigator Award.
- Google 2018 Faculty Research Award.
- Stanford **BENCHMARK** Graduate Fellowship in Science and Eng. (2009-2012).
- Department and Institute **rank 1/800**, Sharif University of Technology (2009).

SUMMARY OF RESEARCH SUPPORT AT USC Total Funding: \approx \$3.7 million
• Funding as PI: \approx \$2.5 million
• Funding as co-PI: \approx \$1.2 million

- ACTIVE RESEARCH SUPPORT
- **Packard Fellowship in Science and Engineering**
David and Lucile Packard Foundation
Role: Principal Investigator. Dates: 11/09/2018 -11/08/2023.
Amount: \$875,000.
 - **Sloan Fellowship in Mathematics**
Alfred P. Sloan Foundation
Role: Principal Investigator. Dates: 09/15/2019 -09/14/2021.
Amount: \$70,000.
 - **NSF CAREER Award: “CAREER: Guaranteed Nonconvex Optimization for High-Dimensional Learning”**
National Science Foundation
Role: Principal Investigator. Dates: 02/01/2019-01/31/2024.
Amount: \$551,596. Percentage of time: %11 academic effort.
 - **AFOSR 2018 Young Investigator Award: “Learning data representations via nonconvex optimization”**
Air force office of scientific research
Role: Principal Investigator. Dates: 01/02/2018-31/01/2021.
Amount: \$450,000. Percentage of time: %16.5 academic effort.
 - **NSF CIF Small: “Precise Computational and Statistical Tradeoffs for Iterative Signal Estimation and Supervised Learning”**
National Science Foundation
Role: Principal Investigator. Dates: 07/01/2018-06/30/2021.
Amount: \$450,000. Percentage of time: %11 academic effort.
 - **DARPA LwLL: “INTEGRAL: A Foundational Approach to Label Complexity via Information Theory and Graph Signal Processing”**
DARPA
Role: Co-Investigator (PI: S. Avestimehr, other co-PIs: A. Ortega and I. Diakonikolas). Dates: 09/19/2019-09/18/2022.
Amount: \$462,000 of \$1,498,146.
 - **DARPA FastNICs: DIAMOND: Distributed Training of Massive Models at Bandwidth Frontiers**
DARPA
Role: Co-Investigator (PI: S. Avestimehr, other co-PI: M. Annavaram). Dates: 04/01/2020-03/31/2024.
Amount: \$512,375 of \$2,200,000.

- COMPLETED RESEARCH SUPPORT
- **Google Faculty Research Award: “Towards understanding extreme classification”**
Google Institute
Role: Principal Investigator. Dates: 03/05/2018-03/05/2019.
Amount: \$52,190.
 - **AFRL FA8650-17-C-9112: “Ptychography based Rapid Imaging of Nano-Structures with Multi-layer Assemblies (PRISMA)”**
Air Force Research Laboratory
Role: Co-Investigator (PI: J. Damoulakis). Dates: 11/2016-2/2018.
Amount: \$221,922 of \$10,287,412. Percentage of time: %20 academic effort.
 - **Northrop Grumman contract: “DENO: Distributed Encoded Optimization for Cybersecurity Data Analytics”**
Role: Co-Investigator (PI: S. Avestimehr). Dates: 09/01/2017-08/31/2018.
Amount: \$50,000 of \$100,000. Percentage of time: %8 academic effort.

SCHOLARLY
IMPACT

All numbers based on google scholar as of March 15, 2020.

- Total citations to articles: 3532.
- Total citations accrued while at USC (2015-present): 3185.

PUBLICATIONS

Prepared according to USC (UCAPT) policy which requires the ordering of the authors to be explained and candidate's student or post-doc to be highlighted with an asterisk.

notation	stands for
*	candidate's student or postdoc
underline	senior author
($\alpha\beta$ order)	alphabetic ordering of names (norm in math/theory publications)
no specification	authors ordered according to contribution

- Dissertation
 - [1] **M. Soltanolkotabi**. Algorithms and Theory for Clustering and Nonconvex Quadratic Programming. Stanford University Ph.D. Dissertation August 2014.
- Preprints (Referee process not complete)
 - [2] A. Javanmard, **M. Soltanolkotabi**, and H. Hassani. Precise Tradeoffs in Adversarial Training for Linear Regression. Submitted, preprint available at arXiv:2002.10477.
 - [3] R. Heckel and **M. Soltanolkotabi** ($\alpha\beta$ order). Compressive sensing with untrained neural networks: Gradient descent finds the smoothest approximation. Submitted, 2020.
 - [4] I. Diakonikolas, S. Goel, S. Karmalkar, A. Klivans, and **M. Soltanolkotabi** ($\alpha\beta$ order). Approximation Schemes for ReLU Regression. Submitted 2020.
 - [5] Y. Cheng, I. Diakonikolas, R. Ge, and **M. Soltanolkotabi** ($\alpha\beta$ order). High-dimensional Robust Mean Estimation via Gradient Descent. Submitted 2020.
 - [6] H. Mohammadi, A. Zare, **M. Soltanolkotabi**, M. R. Jovanovic. Convergence and sample complexity of gradient methods for the model-free linear quadratic regulator problem. Submitted, preprint available at arXiv:1912.11899.
 - [7] Z. Fabian*, J. Haldar, R. Leahy, **M. Soltanolkotabi** ($\alpha\beta$ order). 3D Phase Retrieval at Nano-Scale via Accelerated Wirtinger Flow. Submitted, preprint available at arXiv:2002.11785.
 - [8] D. V. Veen, A. Jalal, **M. Soltanolkotabi**, E. Price, S. Vishwanath, and A. G. Dimakis. Compressed Sensing with Deep Image Prior and Learned Regularization. Submitted, preprint available at arXiv:1806.06438.
 - [9] S. Oymak, Z. Fabian*, M. Li, and **M. Soltanolkotabi**. Generalization Guarantees for Neural Networks via Harnessing the Low-rank Structure of the Jacobian. Submitted, preprint available at arXiv:1906.05392.
 - [10] S. Oymak and **M. Soltanolkotabi** ($\alpha\beta$ order). Towards moderate overparameterization: global convergence guarantees for training shallow neural networks. Submitted, preprint available at arXiv:1902.04674.
 - [11] S. Oymak and **M. Soltanolkotabi** ($\alpha\beta$ order). End-to-end Learning of a Convolutional Neural Network via Deep Tensor Decomposition. Submitted, preprint available at arXiv:1805.06523.

- [12] S. Avestimehr, M. Mousavi Kalan*, and **M. Soltanolkotabi** ($\alpha\beta$ order). Fundamental Resource Trade-offs for Encoded Distributed Optimization. Under revision in Information and Inference. Preprint available at arXiv:1804.00217.
- [13] Z. Fabian*, R. Xu, **M. Soltanolkotabi**, J. P. Haldar, W. Unglaub, J. Zusman, A. F. Levi, R. Leahy. Accelerated Wirtinger Flow: A fast algorithm for ptychography. Under revision optics express. Preprint available at arXiv:1806.05546.
- Refereed Publications
- [14] R. Heckel and **M. Soltanolkotabi** ($\alpha\beta$ order). Denoising and Regularization via Exploiting the Structural Bias of Convolutional Generators. To appear in International Conference on Learning Representations (ICLR 2020). Preprint available at arXiv:1910.14634.
- [15] M. Li, **M. Soltanolkotabi**, and S. Oymak. Gradient Descent with Early Stopping is Provably Robust to Label Noise for Overparameterized Neural Networks. To appear in International Conference on Artificial Intelligence and Statistics (AISTATS 2020). Preprint available at arXiv:1903.11680.
- [16] S. Oymak and **M. Soltanolkotabi** ($\alpha\beta$ order). Overparameterized Nonlinear Learning: Gradient Descent Takes the Shortest Path? International Conference on Machine Learning (ICML 2019)
- [17] Q. Yu, S. Li, N. Raviv, M. Mousavi Kalan*, **M. Soltanolkotabi**, and S. Avestimehr. Lagrange Coded Computing: Optimal Design for Resiliency, Security and Privacy. International Conference on Artificial Intelligence and Statistics (AISTATS 2019).
- [18] H. Mohammadi, A. Zare, **M. Soltanolkotabi**, and M. Jovanovic. Global Exponential Convergence of Gradient Methods Over the Nonconvex Landscape of the Linear Quadratic Regulator. 58th IEEE Conference on Decision and Control (CDC 2019)
- [19] **M. Soltanolkotabi**. Structured signal recovery from quadratic measurements: Breaking sample complexity barriers via nonconvex optimization. IEEE Transactions on Information Theory, Volume: 65 , Issue: 4 , April 2019.
- [20] **M. Soltanolkotabi**, A. Javanmard and J. D. Lee. Theoretical insights into the optimization landscape of over-parameterized neural networks. IEEE Transactions of Information Theory, Volume: 65 , Issue: 2 , Feb. 2019.
- [21] M. Mousavi Kalan*, **M. Soltanolkotabi**, and S. Avestimehr. Fitting ReLUs via SGD and Quantized SGD. International Symposium on Information Theory (ISIT 2019)
- [22] **M. Soltanolkotabi**. Phaseless Imaging at Nano-scale: Challenges and Possible Solutions. International Conference on Sampling Theory and Applications (SAMPTA 2019).
- [23] E. Bostan, **M. Soltanolkotabi**, D. Ren, and L. Waller. Accelerated Wirtinger Flow for Multiplexed Fourier Ptychographic Microscopy. IEEE International Conference on Image Processing (ICIP 2018).
- [24] S. Li, M. Mousavi Kalan*, S. Avestimehr, and **M. Soltanolkotabi**. ($\alpha\beta$ order students/faculty) Near-Optimal Straggler Mitigation for Distributed Gradient Methods. 2018 IEEE International Parallel and Distributed Processing Symposium Workshops (IPDPSW)

- [25] **M. Soltanolkotabi**. Learning ReLUs via gradient descent. *Proceedings of Neural Information Processing Systems (NeurIPS 2017)*.
- [26] H. Hassani, **M. Soltanolkotabi**, and A. Karbasi. Gradient methods for sub-modular maximization. *Proceedings of Neural Information Processing Systems (NeurIPS 2017)*.
- [27] S. Oymak and **M. Soltanolkotabi** ($\alpha\beta$ order). Fast and Reliable Parameter Estimation from Nonlinear Observations. *SIAM Journal on Optimization*, 27(4), 2276-2300, 2017.
- [28] R. Heckel and **M. Soltanolkotabi** ($\alpha\beta$ order). Generalized Line Spectral Estimation. *IEEE Transactions on Information Theory*, vol. PP, no. 99, pp. 1-1, 2017.
- [29] S. Oymak, B. Recht, and **M. Soltanolkotabi** ($\alpha\beta$ order). Sharp Time-data tradeoffs for linear inverse problems. *IEEE Transactions on Information Theory*, vol. PP, no. 99, pp. 1-1, 2017.
- [30] S. Oymak, B. Recht, and **M. Soltanolkotabi** ($\alpha\beta$ order). Isometric sketching of any set via the Restricted Isometry Property. *Information and Inference*, 2017.
- [31] S. Tu, R. Boczar, Max Simchowitz, **M. Soltanolkotabi**, and B. Recht. Low-rank Solutions of Linear Matrix Equations via Procrustes Flow. *Proceedings of International Conference on Machine Learning, (ICML 2016)*.
- [32] R. Heckel, V. I. Morghenstern, and **M. Soltanolkotabi** ($\alpha\beta$ order). Super-Resolution Radar. *Information and Inference* 5 (1): 22-75, 2016.
- [33] Experimental robustness of Fourier Ptychography phase retrieval algorithms L. Yeh, J. Dong, J. Zhong, L. Tian, M. Chen, G. Tang, **M. Soltanolkotabi**, L. Waller. *Optics Express Vol. 23, Issue 26, pp. 33214-33240, 2015*.
- [34] E. J. Candés, X. Li, and **M. Soltanolkotabi** ($\alpha\beta$ order). Phase Retrieval via Wirtinger Flow: Theory and Algorithms. *IEEE Transactions on Information Theory*, Vol.61, No.4, pp.1985-2007, April 2015.
- [35] E. J. Candés, X. Li, and **M. Soltanolkotabi** ($\alpha\beta$ order). Phase Retrieval from coded diffraction patterns. *Applied and Computational Harmonic Analysis* 39(2), 2015.
- [36] **M. Soltanolkotabi**, E. Elhamifar, and E. J. Candés. Robust subspace clustering. *Annals of Statistics* 42(2), 669-699, 2014.
- [37] **M. Soltanolkotabi** and E. J. Candés. A geometric analysis of subspace clustering with outliers. *Annals of Statistics* 40(4), 2195-2238, 2012.
- [38] E. J. Candés and **M. Soltanolkotabi**. Discussion of “Latent Variable Graphical Model Selection via Convex Optimization”, *Annals of Statistics* 40(2), 1997-2004, 2012.
- [39] F. Marvasti, A. Amini, F. Haddadi, **M. Soltanolkotabi**, B. Khalaj, A. Aldroubi, S. Sanei and J. Chambers. A Unified Approach to Sparse Signal Processing. *EURASIP Journal on Advances in Signal Processing* 44, 2012.

- Old publications (during undergrad)

- [40] P. Pad, **M. Soltanolkotabi**, S. Hadikhanlou, A. Enayati and F. Marvasti. Errorless Codes for Over-loaded Wireless CDMA with Active User Detection. *Proc. of the International Conference on Communications (ICC 2009), Dresden, Germany.*
- [41] **M. Soltanolkotabi**, A. Amini and F. Marvasti. OFDM Channel Estimation based on Adaptive Thresholding for Sparse Signal Detection. *Proc. European Signal Processing Conference (EUSIPCO 2009).*
- [42] **M. Soltanolkotabi** and F. Ashtiani. Throughput Capacity of a Multi-channel Multi-hop Mobile Ad-hoc Networks. *Proc. International Conference on Telecommunications (ICT 2009).*
- [43] **M. Soltanolkotabi**, M. Soltanalian, A. Amini and F. Marvasti. A Practical Sparse Channel Estimation for Current OFDM Standards. *Proc. International Conference on Telecommunications (ICT 2009).*
- [44] S. Feizi-Khankandi, S. Zahed Pour, **M. Soltanolkotabi**, A. Amini and F. Marvasti. Salt and Pepper Noise Removal for Images. *Proc. International Conference on Telecommunications (ICT 2008).*

INVITED TALKS

- Denoising via Early Stopping. TRIPODS Summer School and Workshop on the Foundations Graph and Deep Learning Mathematical Institute for Data Science (MINDS) at Johns Hopkins University, Baltimore, MD, May 2020.
- Denoising via Early Stopping. Workshop on Solving inverse problems with deep networks: New architectures, theoretical foundations, and applications *Neural Information Processing Systems (Neurips 2019) workshop, Vancouver, Canada, December 2019.*
- Towards demystifying neural networks: Optimization, robustness and denoising *Conference on Optimization, Fields Institute for Research in Mathematical Sciences, Toronto, Canada, November 2019.*
- Theoretical Foundations for Nonconvex Learning and Optimization *Packard Foundation, Monterey, CA, September 2019.*
- Demystifying Generalization and Early Stopping in Deep Learning via Harnessing the Low-rank Structure of the Jacobian AI Institute Geometry of Deep Learning, Microsoft Research, Seattle, WA, August 2019.
- Towards demystifying over-parameterization and early stopping in deep learning *International Conference on Continuous Optimization (ICCOPT 2019), Berlin, Germany, August 2019.*
- Over-parameterized nonlinear learning - Gradient descent follows the shortest path? *International Conference on Stochastic Programming, Trondheim, Norway, July 2019.*
- Towards demystifying over-parameterization and early stopping in deep learning *Joint Statistical Meeting (JSM 2019), Denver, CO, July 2019.*
- 3D Phaseless Imaging at Nano-scale: Challenges and Possible Solutions *International Conference on Sampling Theory and Applications (SAMPTA 2019), Bordeaux, France, July 2019.*
- Overparameterization without Overfitting: Jacobian-based Generalization Guarantees for Neural Networks *Understanding and Improving Generalization in Deep Learning, International Conference on Machine Learning (ICML 2019), Long Beach, CA, June 2019.*
- Towards demystifying over-parameterization and early stopping in deep learning *WNGC Seminar, University of Texas, Austin, May 2019.*

- Towards demystifying over-parameterization in deep learning
Geometry of Big Data, Institute for Pure and Applied Mathematics (IPAM), Los Angeles, CA, May 2019.
- Towards demystifying over-parameterization in deep learning
Imaging and Machine Learning Workshop, Henri Poincare Institute, Paris, France, April 2019.
- Over-parameterized nonlinear learning - Gradient descent follows the shortest path?
Data Science Insitute, San Francisco, CA, March, 2019.
- Over-parameterized nonlinear learning - Gradient descent follows the shortest path?
Theory and Practice in Machine Learning and Computer Vision, Institute for Computational and Experimental Research in Mathematic (ICERM), Providence, Rhode Island, February 2019.
- Towards demystifying over-parameterization in deep learning
Information Theory and Applications Workshop (ITA), San Diego, CA, February 2019.
- Overparameterized Nonlinear Learning: Gradient Descent Takes the Shortest Path?
CMStatistics, Pisa, Italy, December 2018.
- Overparameterized Nonlinear Learning: Gradient Descent Takes the Shortest Path?
Canadian Mathematical Society winter meeting, Vancouver, Canada, December 2018.
- From shallow to deep: learning neural networks via gradient descent. *Department of Electrical Engineering, University of Pennsylvania, Philadelphia, PA, October 2018.*
- From shallow to deep: learning neural networks via gradient descent. *International Symposium on Mathematical Programming (ISMP), Bordeaux, France, July 2018.*
- Nonconvex optimization meets suprema of stochastic process: From phase retrieval to deep learning. *IPAM culminating workshop on Quantitative Linear Algebra, Lakearowhead, CA, June 2018.*
- From shallow to deep: Learning neural networks via gradient descent. *Simons Foundations of Machine Learning Reunion Workshop, Berkeley, CA, June 2018.*
- Nonconvex optimization for high-dimensional learning: ReLUs, neural nets and beyond, *Workshop on Applied Harmonic Analysis and Data Processing, Oberwolfach Research Institute for Mathematics, German Black Forest, March 2018.*
- Nonconvex optimization for high-dimensional learning: ReLUs, neural nets and beyond, *Courant Institute of Mathematical Sciences, Math and Data Seminar, New York, NY, March 2018.*
- Nonconvex optimization for high-dimensional learning: ReLUs, neural nets and beyond, *Program in Applied and Computational Mathematics (PACM) colloquim, Princeton, NJ, March 2018.*
- Learning from signals and data via nonconvex optimization: ReLUs, neural nets and beyond, *ARO Workshop on data science, a unified vision towards structured and unstructured data analysis, Raleigh, NC, November 2017.*
- Directions and open problems in elements of non-convex optimization, *Workshop on Beyond Convexity: Emerging Challenges in Data Science, Banff International Research Station, Oaxaca, Mexico, October 2017.*
- Nonconvex optimization meets supremum of stochastic processes, *Probability Seminar, UC Irvine, CA, October 2017.*
- Discrete submodular optimization via continuous nonconvex optimization, *Asilomar invited session, Asilomar, CA, October 2017.*
- Nonconvex optimization for high-dimensional Learning: from neural networks to submodular maximization, *Workshop on Fast Iterative Methods in Optimization, Simons Institute, Berkeley, CA, October 2017.*
- Leveraging prior knowledge in phase retrieval: From theory to practice, *Workshop on Phaseless Imaging in Theory and Practice: Realistic Models, Fast Algorithms, and Recovery Guarantees, Institute for Mathematics and its Applications, Minneapolis, MN, August 2017.*

- Nonconvex optimization for high-dimensional learning: from phase retrieval to sub-modular maximization, *EE Systems Seminar, California Institute of Technology, Pasadena, CA, May 2017*.
- Nonconvex optimization for high-dimensional learning: From phase retrieval to sub-modular maximization, *EE Systems Seminar, North Carolina State, Durham, CA, June 2017*.
- Breaking sample complexity barriers via non-convex optimization, *Conference on Nonconvex Statistical Learning, USC, Los Angeles, CA, 2017*.
- Breaking sample complexity barriers via non-convex optimization, *SIAM conference on Optimization, Vancouver, Canada, May 2017*.
- *Information Theory and Applications workshop, San Diego, CA, February 2017*.
- Breaking sample complexity barriers via non-convex optimization, *Joint Mathematical Meeting, Special Session on Mathematics of Signal processing, Atlanta, GA, January 2017*.
- Breaking sample complexity barriers via non-convex optimization, *BIRS Workshop on Applied Harmonic Analysis, Massive Data Sets, Machine Learning, and Signal Processing, Oaxaca, Mexico, October 2016*.
- Structured signal recovery without the shackles of convexity. Claremont McKenna College, Math department September, 2016.
- Breaking sample complexity barriers via non-convex optimization, *International Conference on Continuous Optimization (ICCOPT), Tokyo, August 2016*.
- *NII Shonan Meeting on "Recent Advances in Randomized Numerical Linear Algebra", NII Shonan Meeting, Tokyo, July 2016*.
- Generic Chaining meets (non)convex optimization, *Chaining Methods and their Applications to Computer Science, Harvard University, June 2016*.
- Structured signal recovery without the shackles of convexity, *Statistics Seminar, University of California, Los Angeles(UCLA), May 2016*.
- Phase Retrieval: Theory, Algorithms, and Applications, *tutorial presentation at International Conference on Acoustics, Speech and Signal Processing (ICASSP), Shanghai, China, March 2016*.
- Finding Low-complexity models without the shackles of convexity, *Workshop on Low complexity models in signal processing, Hausdorff research institute for mathematics (HIM), Bonn, Germany, Feb. 2016*.
- Structured signal recovery without the shackles of convexity, *Statistics Seminar, University of California, Los Angeles(UCLA), May 2016*.
- Structured signal recovery without the shackles of convexity, *International Matheon Conference on Compressed Sensing and its Applications, Berlin, Dec 2015*.
- Structured signal recovery without the shackles of convexity, *SIAM Conference on Applied Linear Algebra, Atlanta, October 2015*.
- Structured signal recovery without the shackles of convexity, *Sharif University of Technology, Department of Electrical Engineering, Tehran, Iran, December 2015*.
- Sharp time-data tradeoffs for linear inverse problems, *International Symposium on Optimization, Pittsburg, July 2015*.
- Phase Retrieval via non-convex optimization: Theory and Algorithms, *INFORMS, San Francisco, November 2014*.
- Phase Retrieval via non-convex optimization: Theory and Algorithms, *John Hopkins Center for Imaging Science, October 2014*.
- Phase Retrieval via non-convex optimization: Theory and Algorithms, *UC Berkeley, Networking, Communications, and DSP seminar, September 2014*.
- Robust Subspace Clustering, *Stanford Biostatistics seminar, Feb. 2014*.
- Robust Subspace Clustering, *Asilomar Conference on Signals, Systems and Computers, Oct. 2013*.
- Robust Subspace Clustering, *ICML workshop on spectral learning, June 2013*.
- Robust Subspace Clustering, *Information Theory and Applications workshop, Feb.*

2013.

- Robust Subspace Clustering, *Princeton: MURI annual meeting, October 2012.*
- A geometric analysis of subspace clustering with outliers, *Georgia Tech.: High-Dimensional Phenomena in Statistics and Machine Learning Seminar, July 2012.*
- A geometric analysis of subspace clustering with outliers, *Stanford: Workshop on Modern Massive Data Sets (MMDS), July 2012.*
- A geometric analysis of subspace clustering with outliers, *UC Berkeley: Berkeley robotics lab, Feb 2012.*

TEACHING

- **Instructor**, EE 588: Optimization for the information and data sciences, University of Southern California, Fall 2016, Fall 2017, Fall 2018, Fall 2019. (Course I created/developed).
- **Instructor**, EE 546: Mathematics of high-dimensional data, University of Southern California, Fall 2015, Fall 2016, Fall 2018, Fall 2019. (Course I created/developed).
- **Instructor**, EE 599: High-dimensional probability and statistics for data scientists, University of Southern California, Fall 2017. (Course I created/developed).
- **Instructor**, EE 364a: Convex Optimization, Stanford University, Summer 2011.
- **Guest lecture**, CSCI599: Effective Algorithms in Machine Learning and Statistics, University of Southern California, Spring 2016.

PROFESSIONAL SERVICE

Internal Service

- **Degree/course development**
 - Developed the new M.Sc. in Data Science (with Keith Chugg, Justin Haldar, and Keith Jenkins)
 - new course on Mathematics of High-dimensional Data
 - new course on Optimization for the Information and Data Sciences
 - new course on High-dimensional Probability and Statistics for Data Scientists
- **University-wide community building**
 - Mathematical Foundations of Learning from Signals and Data (Math-FLDS) Started a lunch reading group/seminar for graduate students (collaborators: Antonio Ortega and Salman Avestimehr)
 - Founding faculty of Machine Learning Center (led by Yan Liu) Helped with creation and planning of various center activities such as retreat, seminars and lunch series associated with center
- **Seminar organization**
 - Mathematical Foundations of Learning From Signals and Data (with colleagues in ECE department)
 - CommNets Seminar (with colleagues in ECE department)
 - Machine Learning Seminar (with colleagues in machine learning center)
 - Machine Learning Lunch (with colleagues in machine learning center)
- **Signal and Image Processing Institute (SIPI) Ph.D. screening**

- Exam coordinator: Fall 2016, Spring 2016, and Fall 2017, Fall 2018, Spring 2019.
- Examiner for EE 562a: Spring 2017, Fall 2019, Spring 2020.

External Service

- **Grant review**

- Grant review for AFOSR Young Investigator Program 2018 & 2019
- Grant review panelist for National Science Foundation (4 times during 2015-2020)

- **Educational outreach to local USC neighborhoods**

- High-school show case presentation judge: Orthopaedic Medical Magnet High School 2016.
- Participated in Deloitte impact day and interacted with students of Nava College Prep Academy, June 2017.
- Presented two lectures at Nava College Prep Academy (a local high school in Compton) on the societal impacts of mathematical data analysis based on applications/examples from signal processing, machine learning and artificial intelligence (December 2016 and 2018).

- **Session organization**

- “Optimization meets statistics” with Ubli Mitra, Information Theory and Applications (ITA 2016)
- “Bilinear inverse problems” with Felix Krahmer, Sampling Theory and Applications (SAMPTA 2017)
- “Theory of deep learning” with Misha Belkin, Sampling Theory and Applications (SAMPTA 2019)
- “What is happening in optimization and machine learning”, IEEE International Symposium on Information Theory (ISIT 2020).

- **Area chair/technical program committee**

- Area chair for the International Conference For Learning Representations (ICLR 2019).
- Technical program committee member for the IEEE international conference on Sampling Theory and Applications (SAMPTA 2019).

- **Journal review**

- *Proceedings of National Academy of Science (PNAS)*.
- *Foundations and Trends in Machine Learning*.
- *Annals of Statistics*.
- *IEEE Transactions on Information Theory*.
- *SIAM Journal on Mathematics of Data Science (SIMODS)*.
- *Journal of Machine Learning Research*.
- *Constructive Approximation*.
- *Foundations of Computational Mathematics*.
- *SIAM Journal on Optimization*.
- *IEEE Transactions on Signal Processing*.

- *International Journal of Computer Vision.*
- *SIAM Imaging science.*
- *Statistical Analysis and Data Mining.*
- *IEEE Signal Processing Letters.*

- **Conference review**

- *Neural Information Processing Systems (NIPS 2014, 2015, 2016).*
- *International Conference on Learning representations (ICLR 2018).*
- *International Conference on Learning theory (COLT 2015, 2017, 2018).*
- *International Conference on Machine Learning (ICML 2015, 2018).*
- *IEEE International Symposium on Information Theory (ISIT 2012, 2015, 2017).*
- *Sampling Theory and Applications (SampTA 2015, 2017).*
- *Signal Processing with Adaptive Sparse Structured Representations. (SPARS 2013).*