

Stanford



Mert Pilanci

Assistant Professor of Electrical Engineering

Bio

BIO

Mert Pilanci is an assistant professor of Electrical Engineering at Stanford University. He received his Ph.D. in Electrical Engineering and Computer Science from UC Berkeley in 2016. Prior to joining Stanford, he was an assistant professor of Electrical Engineering and Computer Science at the University of Michigan. In 2017, he was a Math+X postdoctoral fellow working with Emmanuel Candès at Stanford University. His research interests are in large scale machine learning, optimization, and information theory.

ACADEMIC APPOINTMENTS

- Assistant Professor, Electrical Engineering

HONORS AND AWARDS

- Early Career Award, U.S. Army Research Office (2021)
- International Conference on Acoustics, Speech, & Signal Processing (ICASSP) Best Paper Award, IEEE (2021)
- Best Poster Award, Conference on the Mathematical Theory of Deep Neural Networks (2020)
- Faculty Research Award, Facebook (2020)
- Faculty Research Award, Adobe (2019)
- Terman Faculty Fellow, Stanford University (2018)
- Math+X Postdoctoral Fellowship, Simons Foundation (2016)
- PhD Fellowship, Microsoft Research (2013)
- Signal Processing and Communications Applications Conference Best Paper Award, IEEE (2010)

PROGRAM AFFILIATIONS

- Stanford SystemX Alliance

PROFESSIONAL EDUCATION

- Postdoctoral Fellow, Stanford University (2017)
- PhD, University of California, Berkeley, Electrical Engineering and Computer Science (2016)

LINKS

- Homepage: <https://stanford.edu/~pilanci/>

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

Dr. Pilanci's research interests include neural networks, machine learning, mathematical optimization, information theory and signal processing.

Teaching

COURSES

2021-22

- Convex Optimization II: CME 364B, EE 364B (Spr)
- Introductory Research Seminar in Electrical Engineering: EE 301 (Aut)
- Signal Processing for Machine Learning: EE 269 (Aut)

2020-21

- Convex Optimization II: CME 364B, EE 364B (Spr)
- Large Scale Matrix Computation, Optimization and Learning: EE 270 (Win)
- Signal Processing for Machine Learning: EE 269 (Aut)

2019-20

- Convex Optimization II: CME 364B, EE 364B (Spr)
- Large Scale Matrix Computation, Optimization and Learning: EE 270 (Win)
- Signal Processing for Machine Learning: EE 269 (Aut)

2018-19

- Convex Optimization II: CME 364B, EE 364B (Spr)
- Signal Processing for Machine Learning: EE 269 (Win)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Surin Ahn, Hilal Asi, Tavor Baharav, Karan Chadha, Lucas Fuentes Valenzuela, Beliz Gunel, Soheil Hor, Cem Kalkanli, Qianyun Lu, Bennet Meyers-Im, Batu Ozturkler, Khaled Saab, Arda Sahiner, Michael Silvernagel, Joe Vincent

Orals Chair

Chelsea Sidrane

Doctoral Dissertation Advisor (AC)

Tolga Ergen, Rajarshi Saha, Yifei Wang

Master's Program Advisor

Yuhan Zhang

Doctoral (Program)

Amirhossein Afsharrad, Wei-Ning Chen, Gary Cheng, Tolga Ergen, Dorsa Fathollahi, Ibrahim Gulluk, Erin Kunz, Aaron Mishkin, Rajarshi Saha, Arda Sahiner, Siddharth Tanwar, Yifei Wang

Publications

PUBLICATIONS

- **Convex Geometry and Duality of Over-parameterized Neural Networks** *Convex Geometry and Duality of Over-parameterized Neural Networks*
Ergen, T., Pilanci, M.
2021
- **Boost AI Power: Data Augmentation Strategies with Unlabeled Data and Conformal Prediction, a Case in Alternative Herbal Medicine Discrimination with Electronic Nose** *IEEE Sensors Journal*
Liu, L., Zhan, X., Wu, R., Guan, X., Wang, Z., Pilanci, M., Luo, Z., Li, G., Wang, Y.
2021: 1-11
- **Revealing the Structure of Deep Neural Networks via Convex Duality**
Ergen, T., Pilanci, M., Meila, M., Zhang, T.
JMLR-JOURNAL MACHINE LEARNING RESEARCH.2021
- **Global Optimality Beyond Two Layers: Training Deep ReLU Networks via Convex Programs**
Ergen, T., Pilanci, M., Meila, M., Zhang, T.
JMLR-JOURNAL MACHINE LEARNING RESEARCH.2021
- **Adaptive Newton Sketch: Linear-time Optimization with Quadratic Convergence and Effective Hessian Dimensionality**
Lacotte, J., Wang, Y., Pilanci, M., Meila, M., Zhang, T.
JMLR-JOURNAL MACHINE LEARNING RESEARCH.2021
- **Boost AI Power: Data Augmentation Strategies with Unlabelled Data and Conformal Prediction, a Case in Alternative Herbal Medicine Discrimination with Electronic Nose** *IEEE Sensors Journal*
Liu, L., et al
2021
- **WEIGHTED GRADIENT CODING WITH LEVERAGE SCORE SAMPLING**
Charalambides, N., Pilanci, M., Hero, A. O., IEEE
IEEE.2020: 5215–19
- **Separating the Effects of Batch Normalization on CNN Training Speed and Stability Using Classical Adaptive Filter Theory**
Chai, E., Pilanci, M., Murmann, B., Matthews, M. B.
IEEE.2020: 1214-1221
- **Optimal Randomized First-Order Methods for Least-Squares Problems**
Lacotte, J., Pilanci, M., Daume, H., Singh, A.
JMLR-JOURNAL MACHINE LEARNING RESEARCH.2020
- **Global Multiclass Classification from Heterogeneous Local Models** *IEEE Journal on Selected Areas in Information Theory*
Ahn, S., Ozgur, A., Pilanci, M.
2020
- **Lower Bounds and a Near-Optimal Shrinkage Estimator for Least Squares using Random Projections** *IEEE Journal on Selected Areas in Information Theory*
Sridhar, S., Pilanci, M., Ozgur, A.
2020
- **Separating the Effects of Batch Normalization on CNN Training Speed and Stability Using Classical Adaptive Filter Theory**
Chai, E., Pilanci, M., Murmann, B.
arXiv:2002.10674.
2020
- **Distributed Sketching Methods for Privacy Preserving Regression**
Bartan, B., Pilanci, M.
arXiv:2002.06538.

2020

- **Distributed Averaging Methods for Randomized Second Order Optimization**
Bartan, B., Pilanci, M.
arXiv:2002.06540.
2020
- **Limiting Spectrum of Randomized Hadamard Transform and Optimal Iterative Sketching Methods**
Lacotte, J., Liu, S., Dobriban, E., Pilanci, M.
International Conference on Machine Learning (ICML), 2020.
2020
- **Weighted Gradient Coding with Leverage Score Sampling** *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*
Charalambides, N., Pilanci, M., Hero, A. O.
2020
- **Convex Geometry of Two-Layer ReLU Networks: Implicit Autoencoding and Interpretable Models** *23rd International Conference on Artificial Intelligence and Statistics (AISTATS)*
Ergen, T., Pilanci, M.
2020
- **Optimal Randomized First-Order Methods for Least-Squares Problems**
Lacotte, J., Pilanci, M.
arXiv:2002.09488 .
2020
- **Convex Duality of Deep Neural Networks**
Ergen, T., Pilanci, M.
arXiv:2002.09773.
2020
- **Convex Geometry and Duality of Over-parameterized Neural Networks**
Ergen, T., Pilanci, M.
arXiv:2002.11219.
2020
- **Neural Networks are Convex Regularizers: Exact Polynomial-time Convex Optimization Formulations for Two-Layer Networks**
Pilanci, M., Ergen, T.
International Conference on Machine Learning (ICML), 2020.
2020
- **Convex Geometry of Two-Layer ReLU Networks: Implicit Autoencoding and Interpretable Models**
Ergen, T., Pilanci, M., Chiappa, S., Calandra, R.
ADDISON-WESLEY PUBL CO.2020: 4024–32
- **High-Dimensional Optimization in Adaptive Random Subspaces**
Lacotte, J., Pilanci, M., Pavone, M., Wallach, H., Larochelle, H., Beygelzimer, A., d'Alche-Buc, F., Fox, E., Garnett, R.
NEURAL INFORMATION PROCESSING SYSTEMS (NIPS).2019
- **Convex Optimization for Shallow Neural Networks**
Ergen, T., Pilanci, M., IEEE
IEEE.2019: 79–83
- **Distributed Black-Box Optimization via Error Correcting Codes**
Bartan, B., Pilanci, M., IEEE
IEEE.2019: 246–52
- **Straggler Resilient Serverless Computing Based on Polar Codes**
Bartan, B., Pilanci, M., IEEE
IEEE.2019: 276–83

- **Faster Least Squares Optimization**
Lacotte, J., Pilanci, M.
arXiv:1911.02675.
2019
- **Straggler Resilient Serverless Computing Based on Polar Codes** *57th Annual Allerton Conference on Communication, Control, and Computing*
Bartan, B., Pilanci, M.
2019
- **Distributed Black-Box Optimization via Error Correcting Codes** *57th Annual Allerton Conference on Communication, Control, and Computing*
Bartan, B., Pilanci, M.
2019
- **High-Dimensional Optimization in Adaptive Random Subspaces** *Neural Information Processing Systems (NeurIPS)*
Lacotte, J., Pilanci, M., Pavone, M.
2019
- **Fast and Robust Solution Techniques for Large Scale Linear System of Equations**
Ozaslan, I. K., Pilanci, M., Arikan, O., IEEE
IEEE.2019
- **CONVEX RELAXATIONS OF CONVOLUTIONAL NEURAL NETS**
Bartan, B., Pilanci, M., IEEE
IEEE.2019: 4928–32
- **ITERATIVE HESSIAN SKETCH WITH MOMENTUM**
Ozaslan, I., Pilanci, M., Arikan, O., IEEE
IEEE.2019: 7470–74
- **NEWTON SKETCH: A NEAR LINEAR-TIME OPTIMIZATION ALGORITHM WITH LINEAR-QUADRATIC CONVERGENCE** *SIAM JOURNAL ON OPTIMIZATION*
Pilanci, M., Wainwright, M. J.
2017; 27 (1): 205–45
- **Randomized sketches for kernels: Fast and optimal non-parametric regression** *Annals of Statistics*
Yang, Y., Pilanci, M., Wainwright, M. J.
2017
- **Iterative Hessian sketch: Fast and accurate solution approximation for constrained least-squares** *Journal of Machine Learning Research (JMLR)*
Pilanci, M., Wainwright, M. J.
2016
- **Sparse learning via Boolean relaxations** *Mathematical Programming*
Pilanci, M., Wainwright, M. J., El Ghaoui, L.
2015
- **Randomized Sketches of Convex Programs With Sharp Guarantees** *IEEE Transactions on Information Theory*
Pilanci, M., Wainwright, M. J.
2015
- **Structured least squares problems and robust estimators** *IEEE Transactions on Signal Processing*
Pilanci, M., Arikan, O., Pinar, M. C.
2010