DOGYOON SONG

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ACADEMIC POSITIONS

University of California , Davis, CA Assistant Professor of Statistics	July 2024 - present	
University of Michigan , Ann Arbor, MI Postdoctoral Research Fellow Mentors: Alfred O. Hero and Qing Qu	July 2021 - June 2024	
Max Planck Institute for Mathematics in the Sciences, Leipzig, Germany Visiting Postdoctoral Researcher Convexity, Optimization and Data Science Research Group Mentor: Venkat Chandrasekaran	Aug - Sep 2021	
EDUCATION		
Massachusetts Institute of Technology, Cambridge, MA Ph.D. in Electrical Engineering and Computer Science (EECS) Thesis title: Addressing Missing Data and Scalable Optimization for Data-driven Decision M Advisors: Pablo A. Parrilo and Devavrat Shah GPA: 5.0/5.0	June 2021 aking.	
Massachusetts Institute of Technology, Cambridge, MA S.M. in Electrical Engineering and Computer Science (EECS) Thesis title: <i>Blind Regression: Nonparametric Regression for Latent Models via Collaborative</i> Advisor: Devavrat Shah GPA: 5.0/5.0	June 2016 Filtering.	
Seoul National University, Seoul, South Korea Major: Electrical and Computer Engineering (B.S.) Co-majors: Mathematical Sciences (B.S.); Physics (B.S.); Economics (B.A.) GPA 4.08/4.3, Major GPA: 4.15/4.3, highest honors	February 2013	
HONORS AND AWARDS		
Hewlett Packard Fellowship (MIT School of Engineering)	2017-2018	
Siebel Scholarship	Class of 2016	
Samsung Graduate Fellowship	2014-2019	
Advanced Television and Signal Processing Fellowship (MIT EECS)	2014-2015	
Korea Foundation for Advanced Studies Graduate Fellowship	2013- (declined)	
Excellence Award for Outstanding Graduates (SNU School of Engineering)	2013	

PUBLICATIONS

Note: " $(\alpha - \beta)$ " denotes alphabetical author order, and " \star " denotes equal contribution as co-first authors.

JOURNAL PUBLICATIONS

- (α-β) Y. Chen^{*}, **D. Song**^{*}, X. Xi, Y. Zhang, Local minima structures in Gaussian mixture models. *IEEE Transactions on Information Theory*, 2024.
- 2. **D. Song**, P. A. Parrilo, On approximations of the PSD cone by a polynomial number of smaller-sized PSD cones. *Mathematical Programming*, 2023.
- Y. Wang, Z. Sun, D. Song, A. O. Hero, Kronecker-structured covariance models for multiway data. Statistic Surveys, 2022.

- (α-β) A. Agarwal^{*}, D. Shah, D. Shen^{*}, **D. Song^{*}**, On robustness of principal component regression. Journal of the American Statistical Association, 2021.
- 5. (α-β) Y. Li, D. Shah, D. Song*, C. E. Lee Yu* (formerly C. E. Lee), Nearest neighbors for matrix estimation interpreted as blind regression for latent variable model. *IEEE Transactions on Information Theory*, 2019.

PEER-REVIEWED CONFERENCE PUBLICATIONS

- H. Zhang^{*}, Y. Lu^{*}, I. Alkhouri, S. Ravishankar, D. Song, Q. Qu, Improving training efficiency of diffusion models via multi-stage framework and tailored multi-decoder architecture. *IEEE / CVF Computer Vision and Pattern Recognition Conference*, 2024.
- S. Kwon^{*}, Z. Zhang^{*}, D. Song, L. Balzano, Q. Qu, Efficient low-Dimensional compression of overparameterized models.

International Conference on Artificial Intelligence and Statistics, 2024.

- D. Song^{*}, K. Han^{*}, Errors-in-variables Fréchet regression with low-rank covariate approximation. Conference on Neural Information Processing Systems, 2023.
- Z. Sun^{*}, D. Song^{*}, A. O. Hero, Minimum-risk recalibration of classifiers. Conference on Neural Information Processing Systems, 2023. [Spotlight].
- 5. J. Jia, Y. Zhang, **D. Song**, S. Liu A. O. Hero, Robustness-preserving lifelong learning via dataset condensation. *IEEE International Conference on Acoustics, Speech and Signal Processing*, 2023.
- (α-β) D. Shah, D. Song^{*}, Z. Xu^{*}, Y. Yang, Sample efficient reinforcement learning via low-rank matrix estimation. Conference on Neural Information Processing Systems, 2020.
- (α-β) A. Agarwal^{*}, D. Shah, D. Shen^{*}, D. Song^{*}, On robustness of principal component regression. Conference on Neural Information Processing Systems, 2019. [Selected for oral presentation]
- (α-β) C. E. Lee*, Y. Li, D. Shah, D. Song*, Blind regression: Nonparametric regression for latent variable models via collaborative filtering. Conference on Neural Information Processing Systems, 2016.
- T. Kim, D. Song, S. Youn, J. Park, H. Park, J. Kim, Verifying start-up failures in coupled ring oscillators in presence of variability using predictive global optimization. *IEEE/ACM International Conference on Computer-Aided Design*, 2013.
- J. Kim, J. Lee, D. Song, T. Kim, K.-H. Kim, S. Jung, S. Youn, Discretization and discrimination methods for design, verification, and testing of analog/mixed signal circuits. *IEEE Custom Integrated Circuits Conference*, 2013.
- D. Song, J. Kim, A low-power high-radix switch fabric based on low-swing signaling and partially-activated input lines.

International Symposium on VLSI Design, Automation, and Test, 2013.

Preprints

- 1. R. Malinas, **D. Song**, B. D. Robinson and A. O. Hero, High-dimensional sequential change detection. Preprint available online at https://arxiv.org/abs/2502.05377 (v1, February 2025).
- 2. D. Shen^{*}, **D. Song**^{*}, P. Ding and J. Sekhon, Algebraic and statistical properties of the ordinary least squares interpolator.

Preprint available online at https://arxiv.org/abs/2309.15769 (v2, May 2024).

- 3. R. Malinas, **D. Song**, and A. O. Hero, Community detection in high-dimensional graph ensembles. Preprint available online at https://arxiv.org/abs/2312.03900 (v1, December 2023).
- D. Song, A. O. Hero, On separability of covariance in multiway data analysis. Under review. Preprint available online at https://arxiv.org/abs/2302.02415 (v2, October 2023).
- (α-β) D. Shah, D. Song, Learning RUMs: Reducing mixture to single component via PCA. Preprint available online at https://arxiv.org/abs/1812.11917 (v3, March 2020).
- (α-β) D. Shah, D. Song, Deconvolution with unknown error distribution interpreted as blind isotonic regression. Preprint available online at https://arxiv.org/abs/1803.03469 (v3, April 2020).

TEACHING EXPERIENCES

Massachusetts Institute of Technology — Teaching Assistant	
\cdot Algebraic Techniques and Semidefinite Optimization (MIT 6.256)	Spring 2019
\cdot Inference and Information (MIT 6.437)	Spring 2018
\cdot Nonlinear Programming (MIT 6.252)	Spring 2017
Seoul National University — Teaching Assistant	
\cdot Engineering Mathematics 2 (SNU 033.015)	Spring 2014
· Engineering Mathematics 1 (SNU 033.014)	Fall 2013

SUMMER INTERNSHIP EXPERIENCES

Thomson Reuters Labs — Research Intern

SERVICE AND LEADERSHIP

Organizing Workshops

Co-organizer, INFORMS Annual Meeting session on "Geometry and Optimization Methods" October 2023

Summer 2017

Co-organizer, SIAM Conference on Applied Algebraic Geometry mini-symposium on "Algebraic Methods for Convex Sets" July 2019

Reviewer

SIAM Journal on Applied Algebra and Geometry, Annals of Statistics, Mathematical Programming, IEEE Transactions on Information Theory, Information and Inference, American Mathematical Society (book chapter), Conference on Neural Information Processing Systems, International Conference on Machine Learning, Conference on Learning Theory, International Conference on Artificial Intelligence and Statistics, Information Theory Workshop, Conference on Parsimony and Learning

INTERNAL SERVICES

Reader for MIT EECS PhD applications	2017 - 2018
MIT LIDS Career Mentoring Committee	2017 - 2018
MIT LIDS Annual Student Conference Organizing Committee	2016 - 2017
MIT LIDS Social Committee	2015 - 2016

STUDENT MENTORING

- Soo Min Kwon (U-M ECE)
- Huijie Zhang (U-M ECE)
- Robert Malinas (U-M ECE)
- Zeyu Sun (U-M ECE)
- Wayne Wang (U-M Statistics)
- Yihua Li (MIT EECS)

REFERENCES

Alfred O. Hero, III (hero@umich.edu)John H. Holland Distinguished University Professor of EECSR. Jamison and Betty Williams Professor of Engineering, University of Michigan

Pablo A. Parrilo (parrilo@mit.edu) Joseph F. and Nancy P. Keithley Professor, Dept. of EECS, MIT

Devavrat Shah (devavrat@mit.edu) Andrew (1956) and Erna Viterbi Professor, Dept. of EECS, MIT