

Soo Min Kwon

CONTACT INFORMATION

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RESEARCH STATEMENT

I am interested in improving the inference efficiency and our understanding deep learning models through the lens of low-dimensional modeling, with applications in imaging and recommendation systems (e.g. matrix completion).


EDUCATION


University of Michigan Ann Arbor, MI
Ph.D., Electrical Engineering and Computer Science Sept. 2022 – Present
• Advisors: Prof. Laura Balzano and Prof. Qing Qu

Rutgers University New Brunswick, NJ
M.S., Electrical and Computer Engineering Sept. 2020 – May 2022
• Advisor: Prof. Anand D. Sarwate

Rutgers University New Brunswick, NJ
B.S., Electrical and Computer Engineering (High Honors) Sept. 2016 – May 2020
• Minor: Mathematics

WORK EXPERIENCE

Applied Scientist Intern Aug. 2024 – Current
 Amazon Seattle, WA
• Designing deep learning pipelines for variance reduction in heavy-tailed data when estimating average treatment effects for causal inference

Applied Research Data Science Intern May 2022 – Aug. 2022
 LinkedIn Corporation Remote
• Designed and productionized an efficient machine learning pipeline that improved LinkedIn's data cluster forecasting model by over 10% in MAPE, facilitating more accurate hardware ordering for the next calendar year

PREPRINTS

- * A. Ghosh[†], **S. Kwon**[†], R. Wang, S. Ravishankar, Q. Qu. “The Learning Dynamics of Deep Matrix Factorization at the Edge of Stability.” Submitted to the *International Conference on Learning Representations (ICLR)*, 2025.
- * **S. Kwon**[†], C. Blocker[†], H. Raja, J. Fessler, L. Balzano. “Dynamic Subspace Estimation from Undersampled Data using Grassmannian Geodesics.” Submitted to *International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2025.
- * X. Li, **S. Kwon**, I. Alkhouri, S. Ravishankar, Q. Qu. “Decoupled Data Consistency for Solving General Inverse Problems with Diffusion Models.” Submitted to the *International Journal of Computer Vision (IJCV)*, 2024. [[Paper](#)]

PUBLICATIONS ([†]EQUAL CONTRIBUTION)

- * C. Lee, **S. Kwon**, Q. Qu, H. Lee. “BLAST: Block-Level Adaptive Structured Matrices for Efficient Deep Neural Network Inference.” In *Neural Information Processing Systems (NeurIPS)*, 2024.
- * **S. Kwon**, L. Ding, L. Balzano, Q. Qu. “On the Relationship Between Small Initialization and Flatness in Deep Networks.” In *ICLR Bridging the Between Gap Practice and Theory (BGPT) Workshop*, 2024. [[Paper](#)]

- * **S. Kwon**, Z. Zhang, D. Song, L. Balzano, Q. Qu. “Efficient Compression of Overparameterized Deep Models.” In *International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2024. [Paper]
- * **S. Kwon**, Z. Zhang, D. Song, L. Balzano, Q. Qu. “Efficient Compression of Overparameterized Deep Models.” In *Conference on Parsimony and Learning (CPAL) Spotlight Track*, 2024. [Paper]
- * B. Song[†], **S. Kwon**[†], Z. Zhang, X. Hu, Q. Qu, L. Shen. “Solving Inverse Problems with Latent Diffusion Models via Hard Data Consistency.” In *International Conference on Learning Representations (ICLR)*, 2024 (**Spotlight, Top 5%**). [Paper]
- * D. K. Saha, V. Calhoun, **S. Kwon**, A. D. Sarwate, R. Saha, S. Plis. “Federated, Fast, and Private Visualization of Decentralized Data”. In *International Conference on Machine Learning (ICML) Workshop on Federated Learning*, 2023. [Paper]
- * **S. Kwon**, X. Li, A. D. Sarwate. “Low-Rank Phase Retrieval with Structured Tensor Models.” In *International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 2022. [Paper]
- * D. K. Saha, V. D. Calhoun, Y. Du, Z. Fu, R. Panta, **S. Kwon**, A. D. Sarwate, S. M. Plis. “Privacy-preserving quality control of neuroimaging datasets in federated environments”. In *Organization for Human Brain Mapping (OHBM)*, 2021. [Paper]
- * **S. Kwon**, A. D. Sarwate. “Learning Predictors from Multidimensional Data with Tensor Factorizations”. In *Rutgers University Aresty Undergraduate Research Journal*, 2021. [Paper]
- * **S. Kwon**, S. Yang, J. Liu, X. Yang, W. Saleh, S. Patel, C. Mathews, Y. Chen. “Demo: Hands-Free Human Activity Recognition Using Millimeter-Wave Sensors”. In *IEEE International Symposium on Dynamic Spectrum Access Networks (DySPAN)*, 2019. [Paper]

AWARDS & HONORS

- * Harvey G. and Joyce H. Behner Graduate Fellowship 2024
- * University of Michigan PhD Rackham Merit Fellowship 2023
- * Rutgers ECE Outstanding Master’s Student Award 2022
- * Rutgers ECE Outstanding Teaching Assistant Award 2021
- * Rutgers ECE Departmental Leadership & Service Award 2020
- * Rutgers WINLAB GA/TA Grant 2020 – 2020
- * Rutgers University Dean’s List 2018 – 2020

TECHNICAL SKILLS

- * **Programming Languages:** Python, MATLAB, Scala, SQL, C++
- * **Libraries:** PyTorch, TensorFlow, Jax, Scikit-learn, NumPy, SciPy, Pandas
- * **Software:** AWS, Git, Visual Studio, Tableau, Jupyter Notebook, Microsoft Office, L^AT_EX

REVIEWER SERVICE

- * Neural Information Processing Systems (NeurIPS) Workshop on Diffusion Models, 2023
- * Conference on Parsimony and Learning (CPAL), 2024
- * Neural Information Processing Systems (NeurIPS), 2024