Soo Min Kwon

CONTACT INFORMATION	Phone: (201) 421-8064 Email: soominkwon0402@gmail.com Google Scholar: scholar.google.com/soominkwon	Github: github.com/soominkwon Website: soominkwon.github.io

EDUCATION

University of Michigan — Ann Arbor, MI

Ph.D., Electrical Engineering & Computer Science — Sept. 2022 – Present

- Advisors: Prof. Laura Balzano & 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

PROFESSIONAL EXPERIENCE

Graduate Research Assistant — Sept. 2022 – Present

University of Michigan — Ann Arbor, MI

- Investigating an implicit regularization property in the learning dynamics of gradient descent for training deep networks when starting with small initialization
- Developed an efficient algorithm using Python that leveraged generative models (e.g. diffusion models) to solve inverse problems such as inpainting and deblurring
- Investigated and proposed a provably efficient algorithm in Jax for the compression of deep learning models by studying its learning dynamics

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% MAPE that was used for hardware ordering for the next calendar year
- Optimized several machine learning algorithms such as XGBoost and deep neural networks in Scala and Python

Graduate Research Assistant — Sept. 2020 – May 2022

Rutgers University — New Brunswick, NJ

- Developed a state-of-the-art algorithm in Python to recover time-dependent data from partial information of imaging data
- Designed and implemented an algorithm that allows hospitals to share private data for outlier detection by using t-SNE plots

Data Science Intern — May 2020 – Aug. 2020

Centene Corporation — Remote

- Automated the process of detecting expedition phrases in healthcare forms using Restricted Boltzmann Machines and Convolutional Neural Networks in Tensorflow
- Designed and optimized several machine learning algorithms (support vector machines, logistic regression, XGBoost) for statistical inference on diseases given pharmacy data

PUBLICATIONS

* **S. Kwon**, L. Ding, L. Balzano, Q. Qu. "On the Relationship Between Small Initialization and Flatness in Deep Networks." In *ICLR Workshop BGPT*, 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]

PREPRINTS

* A. Ghosh†, **S. Kwon**†, R. Wang, S. Ravishankar, Q. Qu. "Benign Oscillation within Minimal Invariant Subspaces at the Edge of Stability." Submitted to the *Neural Information Processing Systems (NeurIPS)*, 2024.

* C. Lee, **S. Kwon**, Q. Qu, H. Lee. "BLAST: Block-Level Adaptive Structured Matrices for Efficient Deep Neural Network Inference." Submitted to the *Neural Information Processing Systems (NeurIPS)*, 2024.

* 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]

TECHNICAL SKILLS

* **Programming Languages:** Python, MATLAB, Scala, SQL, C++

* **Libraries:** PyTorch, TensorFlow, Jax, Scikit-learn, NumPy, SciPy, Pandas

* **Software:** AWS EC2, Git, Visual Studio, Tableau, Jupyter Notebook, Microsoft Office, LaTeX

AWARDS & HONORS

* 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

CERTIFICATES   **Neural Networks and Deep Learning** (License #M6TYH2SFB6QV, by Andrew Ng, Coursera)

REVIEWER   ∗ Conference on Parsimony and Learning (CPAL), 2024
SERVICE
                    ∗ Neural Information Processing Systems (NeurIPS) Workshop on Diffusion Models, 2024