Changwoo Lee

Curriculum Vitae

CONTACT INFORMATION	1301 Beal Avenue, Ann Arbor, MI, 48109, USA Email: cwoolee@umich.edu Website: https://changwoolee.github.io/

EDUCATION

University of Michigan, Ann Arbor, Michigan, USA

- Ph.D. in Electrical and Computer Engineering   Aug 2020 – Present
  - Advisor: Prof. Hun-Seok Kim
  - Anticipated Graduation Year: 2025

Hanyang University, Seoul, Republic of Korea

- M.S. in Electronics and Computer Engineering   Mar 2018 – Feb 2020
- B.S. in Electronic Engineering   Mar 2012 – Feb 2018

RESEARCH INTERESTS

Efficient Deep Learning, Structured Matrix, Hardware-friendly Model Compression, and Small Foundation Models.

PROFESSIONAL EXPERIENCE

Graduate Student Research Assistant   Aug 2020 – Present

University of Michigan, Ann Arbor, MI, USA

- Investigating hardware-friendly, adaptive and learnable structured matrix for DNN training, fine-tuning, and inference acceleration
- Proposed generalizable and learnable structured matrix for differentiable DNN compression
- Applied latent-denoising score function estimator to improve efficiency of deep joint source-channel coding

NLP Research Intern   May 2024 – Aug 2024

Samsung Research America, Mountain View, CA, USA

- Investigated efficient fine-tuning methods for on-device foundation models

PUBLICATIONS

- **C. Lee**, S. Kwon, Q. Qu, and H. Kim. "BLAST: Block-Level Adaptive Structured Matrices for Efficient Deep Neural Network Inference." Accepted to *Neural Information Processing Systems (NeurIPS)*, 2024.
- **C. Lee** and H. Kim. "Differentiable Learning of Generalized Structured Matrices for Efficient Deep Neural Networks." In *International Conference on Learning Representations (ICLR)*, 2024. [Paper]
- Z. Fan, Q. Zhang, P. Abillama, S. Shoouri, **C. Lee**, D. Blaauw, H. Kim, and D. Sylvester. "TaskFusion: An Efficient Transfer Learning Architecture with Dual Delta Sparsity for Multi-Task Natural Language Processing." In *Proceedings of the 50th Annual International Symposium on Computer Architecture (ISCA)*, 2023. [Paper]
- C. Bian, C. Hsu, **C. Lee**, and H. Kim. "Learning-Based Near-Orthogonal Superposition Code for MIMO Short Message Transmission." In *IEEE Transactions on Communications (TCOM)*, 2023. [Paper]
- **C. Lee**, X. Hu, and H. Kim "Deep Joint Source-Channel Coding with Iterative Source Error Correction." In *International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2023. [Paper]
- Z. Fan, H. An, Q. Zhang, B. Xu, L. Xu, C. Tseng, Y. Peng, A. Cao, B. Liu, **C. Lee**, Z. Wang, F. Liu, G. Wang, S. Jiang, H. Kim, D. Blaauw, D. Sylvester. "Audio and Image Cross-Modal Intelligence via a 10TOPS/W 22nm SoC with Back-Propagation and Dynamic Power Gating." In *IEEE Symposium on VLSI Circuits (VLSI-Symposium)*, 2022. [Paper]
- D. Kim, **C. Lee**, and K.S. Chung. "A Confidence-Calibrated MOBA Game Winner Predictor." In *IEEE Conference on Games (CoG)*, 2020. [Paper]

	• **C. Lee**, and K.S. Chung. "GRAM: Gradient Rescaling Attention Model for Data Uncertainty Estimation in Single Image Super Resolution." In *IEEE International Conference on Machine Learning and Applications (ICMLA)*, 2019. [Paper]
PREPRINT	• P. Abillama, **C. Lee**, A. Bejarano-Carbo, D. Blaauw, and H. Kim. "From Artificial to Spiking Neural Networks: A Generalized Multi-Level LIF Model." Submitted to *European Conference on Computer Vision (ECCV)*, 2024.
TALK	**SPEECS Seminar** on Generalized Block Low-Rank Structured Matrices. Ann Arbor, MI, USA. [Link] Mar 4 2024

SKILLS

Math. Matrix Decomposition, Linear Algebra, Optimization Theory, Information Theory
Deep Learning. DNN Compression, Weight/Activation Quantization, Transformers, Deep Generative Models, Diffusion Models.
Programming Languages and Frameworks. Python, PyTorch, NumPy, SciPy, Julia, MATLAB.
Relevant Courses.
- Umich EECS 501 Probability and Random Processes
- Umich EECS 551 Matrix Methods for Signal Processing, Data Analysis and Machine Learning
- Umich EECS 559 Optimization Methods in Signal Processing and Machine Learning
- Umich EECS 600 Function Space Methods in System Theory
- Umich EECS 598 Special Topics: Randomized Numerical Linear Algebra for Machine Learning
- Umich EECS 598 Special Topics: Statistical Learning Theory

TEACHING EXPERIENCE

• Embedded System, Hanyang University	Spring 2019
• VLSI Design, Hanyang University	Fall 2018
• SoC Design, Hanyang University	Spring 2018

AWARDS & SCHOLARSHIPS

• Hanyang University TA Scholarship	Spring 2019
• Hanyang Graduate School Scholarship (4 semesters)	2018-2019
• Hanyang Brain Scholarship (2 semesters)	2017
• Undergraduate Scholarship, Korean Government, Korea Student Aid Foundation	Fall 2016
• Undergraduate Scholarship, Hanyang University (2 semesters)	2012-2013

SERVICE

Review Experience.
- NeurIPS 2024, IEEE Transactions on Communications, IEEE Transactions on Mobile Computing

Student Volunteer at ICCV, 2019

[CV compiled on 2024-09-25]