Jae-Won **Chung**

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Summary

I am a second year PhD candidate in CSE at the University of Michigan, working with Professor Mosharaf Chowdhury. My research interest is in the intersection of software systems and deep learning, with a recent focus on sustainability aspects such as energy consumption and carbon footprint. I lead the ML Energy initiative.

Education

University of Michigan — *Ann Arbor, MI, USA*

PH.D. CANDIDATE IN COMPUTER SCIENCE AND ENGINEERING — *Sep 2021 - present*

Seoul National University — *Seoul, South Korea*

B.S. IN ELECTRICAL AND COMPUTER ENGINEERING — *Mar 2015 - Aug 2021*

- GPA: 4.04/4.3 (overall) 4.15/4.3 (major), Summa Cum Laude
- Period includes two years of military service.

Publications

- **Chasing Low-Carbon Electricity for Practical and Sustainable DNN Training,** Zhenning Yang, Luoxi Meng, Jae-Won Chung, Mosharaf Chowdhury, International Conference on Learning Representations (ICLR) Workshop, 2023
- **Zeus: Understanding and Optimizing GPU Energy Consumption of DNN Training,** Jie You*, Jae-Won Chung*, Mosharaf Chowdhury, Symposium on Networked Systems Design and Implementation (NSDI), 2023 (Acceptance rate = 18.38%)
- **ShadowTutor: Distributed Partial Distillation for Mobile Video DNN Inference,** Jae-Won Chung, Jae-Yun Kim, Soo-Mook Moon, International Conference on Parallel Processing (ICPP), 2020 (Acceptance rate = 28.99%)

*** Equal contribution**

Experience

Energy-Efficient Systems for Machine Learning — *SymbioticLab, UMich*

ADVISOR: MOSHARAF CHOWDHURY — *Sep 2022 - Present*

- *Zeus*: Discovered the trade-off between DNN training time and energy. Designed a Multi-Armed Bandit solution for time-energy optimization.
- Mentoring two MS students who work on expanding Zeus to various training scenarios.

Software Systems for Machine Learning — *Software Platform Lab, SNU*

ADVISOR: BYUNG-GON CHUN — *Apr 2020 - Jun 2022*

- *Crane*: A GPU cluster manager for AutoML workloads. Built a Kubernetes backend that scaled to 288 GPUs. Contributed core features such as automatic bootstrapping on Docker Swarm and Kubernetes and log streaming through the EFK (Elasticsearch - Fluent Bit - Kibana) stack.
- Participated in the writing process of Terra (NeurIPS'21), Revamper (ATC'21), and Nimble (NeurIPS'20).

Online Model Specialization for Edge Video DNN Inference — *Virtual Machine and Optimization Lab, SNU*

ADVISOR: SOO-MOOK MOON — *Dec 2019 - Jun 2020*

- *ShadowTutor*: Knowledge distillation from the server to the edge device reduced network data transfer by 95% and increased throughput by 3x.

Few-Shot Learning with Meta-Learning — *Computer Vision Lab, SNU*

ADVISOR: KYOUNG MU LEE — *Jun 2019 - Dec 2019*

- Designed improved meta-initialization methods for Model-Agnostic Meta-Learning (MAML) with neural memory modules and convex programs.

Quantitative Susceptibility Mapping with Deep Learning — *Lab of Imaging Science and Technology, SNU*

ADVISOR: JONGHO LEE — *Jun 2019 - Aug 2019*

- Designed and implemented a full deep learning pipeline for QSM, a vision task for medical diagnostics with 3D MRI field data, including preprocessing (background removal, phase unwrapping, and patch slicing), augmentation (adding fake calcifications) and modeling (CAD-QSMNet).

Open Source Projects

- **BERT4Rec-VAE-Pytorch** (☆243 ⑂ 68), Implementation of BERT4Rec and Netflix VAE recommendation models. PyTorch.
- **Reason** (☆125 ⑂ 2), A shell for research papers. Rust.
- **Zeus** (☆56 ⑂ 9), An energy optimization framework for DNN training. Python and C++.
- **Pegasus** (☆20 ⑂ 2), An SSH command runner with a focus on simplicity. Rust.

Number of stars and forks are as of March 4, 2023.

Honors & Awards

Nov 2022	**Carbon Hack '22 Second Best Solution**, Carbon-Aware DNN Training with Zeus, $25,000	*Green Software Foundation*
Jul 2021	**Kwanjeong Overseas Scholarship**, $100,000 over four years	*Kwanjeong Educational Foundation*
Mar 2019	**Kwanjeong Undergraduate Scholarship**, $20,000 over two years	*Kwanjeong Educational Foundation*

Service

- **Systems/Software Reading Group**, Paper reading group inside Michigan CSE, Organizer since Fall 2022

Teaching

- **Spring 2021 Operating Systems**, Main TA, Managed course projects and led group design reviews.
- **Fall 2020 Computer Organization (Undergraduate architecture)**, Peer tutor, Provided 30 hours of online lecture, **Best Tutor Award!**

Skills

Language	Python, Rust, CUDA, C++, Verilog, C, Bash
Framework	PyTorch, Pandas, Matplotlib, FastAPI
Methodology	Machine Learning, Deep Learning, Multi-Armed Bandit
Tool	Docker, Kubernetes, KubeFlow, LaTeX
English	TOEFL 120 (Perfect score), GRE 167/170/4.5