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Personal Profile

I am a Ph.D. candidate at Kim Jaechul Graduate School of AI, Korea Advanced Institute of Science and Technology (**KAIST AI**). I am fortunate to be advised by Prof. **Chulhee "Charlie" Yun** of Optimization & Machine Learning (**OptiML**) Laboratory, KAIST AI. Previously, I worked at Google NYC as an intern (Student Researcher), hosted by Srdinadh Bhojanapalli. Also, I completed my M.Sc. (in AI) and B.Sc. (in Math, minor in CS, Summa Cum Laude) at KAIST.[?]

My primary research interests lie in optimization, machine learning (ML), and deep learning (DL). During my journey to a Ph.D., my ultimate research goal is to **rigorously understand and practically overcome** the following **three critical challenges in ML/DL:**

Generalizability	**Generalization capabilities of modern language models.** (e.g., length generalization and compositional generalization of Transformers)
Adaptability	**Training adaptable models under an evolving environment.** (e.g., continual learning, maintaining the plasticity of neural networks, sample-efficient reinforcement learning)
Multifacetedness	**Learning with multiple (possibly conflicting and/or orthogonal) goals.** (e.g., minimax optimization, bi-level optimization, fairness in ML)

Publications

International Conferences

[C9] Chang, Hoyeon[☆], Jinho Park[☆], **Hanseul Cho**[☆], Sohee Yang, Miyoung Ko, Hyeonbin Hwang, Seungpil Won, Dohaeng Lee, Youbin Ahn, Minjoon Seo. Characterizing Pattern Matching and Its Limits on Compositional Task Structures. In *Proceedings of the International Conference on Learning Representations (ICLR)*. 2026. [arXiv] [OpenReview]

[C8] **Cho, Hanseul**[☆], Jaeyoung Cha[☆], Srinadh Bhojanapalli, Chulhee Yun. Arithmetic Transformers Can Length-Generalize in Both Operand Length and Count. In *Proceedings of the International Conference on Learning Representations (ICLR)*. 2025. [arXiv] [OpenReview]

[C7] Jung, Hyunji[☆], **Hanseul Cho**[☆], Chulhee Yun. Convergence and Implicit Bias of Gradient Descent on Continual Linear Classification. In *Proceedings of the International Conference on Learning Representations (ICLR)*. 2025. [arXiv] [OpenReview]

[C6] **Cho, Hanseul**[☆], Jaeyoung Cha[☆], Pranjal Awasthi, Srinadh Bhojanapalli, Anupam Gupta, Chulhee Yun. Position Coupling: Improving Length Generalization of Arithmetic Transformers Using Task Structure. In *Advances in Neural Information Processing Systems (NeurIPS)*. 2024. [arXiv] [OpenReview]
- Short version in ICML 2024 Workshop on Long-Context Foundation Models (LCFM).

[C5] Shin, Baekrok[☆], Junsoo Oh[☆], **Hanseul Cho**, Chulhee Yun. DASH: Warm-Starting Neural Network Training in Stationary Settings without Loss of Plasticity. In *Advances in Neural Information Processing Systems (NeurIPS)*. 2024. [arXiv] [OpenReview]
- Short version in ICML 2024 Workshop on Advancing Neural Network Training (WANT): Computational Efficiency, Scalability, and Resource Optimization.

[C4] Lee, Jaewook[☆], **Hanseul Cho**[☆], Chulhee Yun. Fundamental Benefit of Alternating Updates in Minimax Optimization. In *Proceedings of the International Conference on Machine Learning (ICML)*. 2024. [arXiv] [OpenReview]
- **Spotlight at ICML 2024. (Top 3.5%: (144+191) of 9,473 valid submissions)**
- Short version in ICLR 2024 Workshop on Bridging the Gap Between Practice and Theory in Deep Learning (BGPT).

[C3] Lee, Junghyun[☆], **Hanseul Cho**[☆], Se-Young Yun, Chulhee Yun. Fair Streaming Principal Component Analysis: Statistical and Algorithmic Viewpoint. In *Advances in Neural Information Processing Systems (NeurIPS)*. 2023. [arXiv] [OpenReview]

[C2] Lee, Hojoon[☆], **Hanseul Cho**[☆], Hyunseung Kim[☆], Daehoon Gwak, Joonkee Kim, Jaegul Choo, Se-Young Yun, Chulhee Yun. PLASTIC: Improving Input and Label Plasticity for Sample Efficient Reinforcement Learning. In *Advances in Neural Information Processing Systems (NeurIPS)*. 2023. [arXiv] [OpenReview]

[C1] **Cho, Hanseul**[★] and Chulhee Yun. SGDA with Shuffling: Faster Convergence for Nonconvex-PŁ Minimax Optimization. In *Proceedings of the International Conference on Learning Representations (ICLR)*. 2023. [arXiv] [OpenReview]

[?] You can find the source code of this CV here.

[☆] Co-first authors: These authors contributed equally.

[★] Sole first authors.

Notable Domestic Journals/Conferences

- **Cho, Hanseul**[☆], Baekrok Shin[☆], Chaewon Moon[☆], Sang-Geun Hong, U-Ju Byeon, Jin-Yong Sung, Chulhee Yun. Deep Model-Based Optimization of Jamming Effectiveness under Aircraft AESA Radar Operational Environments. *The Journal of Korean Institute of Communications and Information Sciences* (**J-KICS**), vol. 50, no. 11, pp. 1647-1659, 2025. DOI: 10.7840/kics.2025.50.11.1647. [Info]
- Jung, Hyunji[☆], **Hanseul Cho**[☆], Chulhee Yun. Convergence and Implicit Bias of Gradient Descent on Continual Linear Classification. *Short version in the 11th Joint Conference of Korean Artificial Intelligence Association* (**JKAIA 2024**).
  - **Best Paper Award (Top 3) & Oral presentation.**
- **Cho, Hanseul**[★] and Chulhee Yun. SGDA with Shuffling: Faster Convergence for Nonconvex-PŁ Minimax Optimization. *Short version in the 7th Joint Conference of Korea Artificial Intelligence Association* (**JKAIA 2022**).
  - **NAVER Outstanding Theory Paper Award (Top 3) & Oral presentation.**

Education

Korea Advanced Institute of Science and Technology (KAIST) — *Seoul, Republic of Korea*

Ph.D. in Artificial Intelligence — *Sept. 2023 – Current*

- Advisor: Prof. Chulhee Yun (Optimization & Machine Learning (**OptiML**) Laboratory, Kim Jaechul Graduate School of AI (GSAI), KAIST)
- Anticipated Graduation Date: Aug. 2027

KAIST — *Seoul, Republic of Korea*

M.Sc. in Artificial Intelligence — *Mar. 2022 – Aug. 2023*

- Advisor: Prof. Chulhee Yun (Optimization & Machine Learning (**OptiML**) Laboratory, Kim Jaechul Graduate School of AI (GSAI), KAIST)
- Thesis: "Improved Convergence Rate of SGDA by Shuffling: Focusing on the Nonconvex-PŁ Minimax Problems" (Approved by Chulhee Yun, Se-Young Yun, & Donghwan Kim)
- GPA: 4.22/4.3

KAIST — *Daejeon, Republic of Korea*

B.Sc. in Mathematical Sciences — *Mar. 2017 – Feb. 2022*

- Minor in Computing Sciences
- Summa Cum Laude (GPA: 4.05/4.3)

University of Twente — *Enschede, Netherlands*

Exchange Student Program — *Feb. 2020 – Jul. 2020*

- Major in Applied Mathematics

Incheon Science High School (ISHS) — *Incheon, Republic of Korea*

High School — *Mar. 2015 – Feb. 2017*

- Early graduation by one year (i.e., two-year course)

Experiences

Google — *New York, NY, United States*

Internship: Student Researcher Program (On-Site), Engineering — *May 5th 2025 – Aug. 22nd 2025*

- Host: Srinadh Bhojanapalli (Staff Research Scientist at Google DeepMind)
- Notable Co-workers: Hrayr Harutyunyan & Amir Keivan Mohtashami (Research Scientists at Google DeepMind)
- Office: Google NYC, 9th Building (111 8th Ave, New York, NY)
- Research Topic: Advanced attention mechanisms of Transformers for long contexts

KAIST 2021 Post-AI Research Project — *Daejeon, Republic of Korea*

Undergraduate Researcher — *May 2021 – Dec. 2021*

- Jointly advised by Prof. Sangyoon Yi (DS Lab, GSFS, KAIST) & Prof. Jinkyoo Park (Sys. Int. Lab, ISysE, KAIST)
- Project: Research on 'AI-augmented Organizations' of Collaborative Decision Making and Learning. Below, I list my contribution:
  1. *Algorithm Design*: Devised a model-based randomized algorithm for a single-player finite-horizon NK landscape optimization game
  2. *Experiment Assistance*: Conducted experiments on human-AI cooperation based on the algorithm that I devised

Individual Study: Optimization for Deep Learning — *Daejeon, Republic of Korea*

Undergraduate Student @ KAIST — *Mar. 2021 – Jun. 2021*

- Advised by Prof. Jinwoo Shin (ALIN Lab, GSAI, KAIST)
- (1) Gradient-based optimizers for large-batch setting (e.g., LARS & LAMB); (2) Theoretical analysis on gradient clipping (paper reading)

Individual Study: Deep Learning in Computer Vision — *Daejeon, Republic of Korea*

Undergraduate Student @ KAIST — *Sep. 2020 – Feb. 2021*

- Advised by Prof. Jong-chul Ye (BISPL, BBE, KAIST)
- Assignment: Semantic segmentation of kidney tumor with U-Net (with KiTS19 challenge dataset)
- Self-taught PyTorch coding on Linux Ubuntu

Individual Study: Statistical Learning Theory — *Daejeon, Republic of Korea*

Undergraduate Student @ KAIST — *Jun. 2020 – Aug. 2021*

- Advised by Prof. Yeonseung Chung (MAS, KAIST)
- Resource: Gareth James, Daniela Witten, Trevor Hastie, and Robert Tibshirani. "An Introduction to Statistical Learning: with Applications in R." Springer, 2013. [link]

Seminars

SNU-KAIST AI/ML Theory Workshop — *Gangneung, Republic of Korea*

Organizer — *Aug. 12th–14th, 2024*

- Homepage: nick-jhlee.github.io/snu-kaist-workshop
- Jointly organized by three research groups of Prof. Ernest K. Ryu, Prof. Min-hwan Oh, and Prof. Chulhee Yun.

Machine/Deep Learning Theory + Physics (MDLTP) Seminar — *Seoul, Republic of Korea*

Organizer — *Jul. 2022 – Feb. 2023*

- Homepage: sites.google.com/view/mdlt-p
- Jointly organized by OSI Lab, OptiML, and CSSPL
- Topics: Learning theory, loss landscape, trajectory analysis, (stochastic) optimization, high-dimensional statistics, statistical/mathematical physics, scientific machine learning, and more.

Geometric Deep Learning Seminar — *Seoul, Republic of Korea*

Participant — *2022*

- A seminar organized by OptiML and OSI Lab
- Resources: [Homepage] [Lecture Videos] [Book]

Awards

2025	**Top Reviewer (Top 1.88%: 206 of 10,943 reviewers),** ICML 2025	*Vancouver, Canada*
2024	**Best Paper Award (Top 3),** JKAIA 2024	*Republic of Korea*
2024	**Top Reviewer (Top 8.60%: 1,304 of 15,160 reviewers),** NeurIPS 2024	*Vancouver, Canada*
2022	**NAVER Outstanding Theory Paper Award (Top 3),** JKAIA 2022	*Republic of Korea*
2022	**Summa Cum Laude,** Bachelor's, KAIST	*Republic of Korea*
2017 – 2020	**The National Scholarship for Science and Engineering,** Korea Student Aid Foundation	*Republic of Korea*
2017 Fall	**Dean's List,** The School of Freshman, KAIST	*Republic of Korea*

Services

Top-tier ML Conference/Journal Reviewer (24 papers) — *From time to time*

- NeurIPS: 2023 (📰📰), 2024* (📰📰📰📰📰📰), 2025 (📰)
  - NeurIPS 2024: awarded Top Reviewer (Top 8.60%: 1,304 of 15,160 reviewers).
- ICML: 2025* (📰📰📰📰📰📰), 2026 (📰📰📰📰📰📰)
  - ICML 2025: awarded Top Reviewer (Top 1.88%: 206 of 10,943 reviewers).
- ICLR: 2024 (📰📰), 2025 (📰📰📰), 2026 (📰📰📰📰).
- TMLR (📰📰📰📰).

1st GPU server manager of OptiML lab — *June 2022 – Feb 2024*

- Being involved in installing OptiML lab's very first 5 GPU servers and a storage server
- Allocating GPU nodes to lab members
- Managing errors occurred in the servers

Tutoring Basic Courses for Freshmen at KAIST *Mar 2018 – Dec 2021*

- Calculus II (2018–2019; 3 times), Introduction to Programming (Fall 2021)
- Allocating GPU nodes to lab members
- Managing errors occurred in the servers

Languages

English Professional Proficiency (i.e., sufficient for academic activities)

Korean Native proficiency

Others Had some introductory courses on French, German, Classical Latin, & Chinese.

Skills

Programming Familiar: **Python (PyTorch, NumPy, Scikit-learn, Jupyter, Pandas, JAX, etc.)**, **MATLAB**.
Novice: C, C++, R, HTML/CSS, Scala

Computer Misc. Familiar: LaTeX (Overleaf/VSCode/MacTex), Git, Microsoft Office, Keynote
Novice: Adobe (Lightroom, Premiere Pro, After Effects, Photoshop)

Music & Hobby Playing the drums and percussion. Begun to learn in 2009.
Joined and performed with the music bands listed below as an amateur drummer.:

- ISHS: *Cha-rang* (2015–2016)
- KAIST: *Muse KAIST* (2017–2019) → *Carpe Diem* (2019)
- Club "Music Space": Team *Woodstone* (2024–2025)
- Team "*Kira-Kira Yoon(tentative name)*" (2025–current)

Also, I am a huge music fan, especially for jazz, funk, K-indie, rock, blues, Latin, house, and many more.