MINHAK SONG

Personal website: http://songminhak.github.io Contact: minhaksong@kaist.ac.kr

EDUCATION

Korea Advanced Institute of Science and Technology Mar 2020 – Current
Daejeon, South Korea (Expected graduation: Aug 2026)
B.S. in Industrial & Systems Engineering and Mathematical Sciences (double major) GPA: 4.19/4.3
Admitted as KAIST Presidential Fellow (KPF, top 3%)
2 years leave of absence for mandatory military service (Feb 2023 – Nov 2024)

University of California, Berkeley Jun 2022 – Oct 2022
Berkeley, United States
Exchange Student, $10,000 funding from KAIST Presidential Fellowship

Korea Science Academy of KAIST Mar 2017 – Feb 2020
Busan, South Korea

RESEARCH INTERESTS

Theoretical Foundations of Modern Machine Learning; Optimization; Sampling; Statistics

PUBLICATIONS

(* denotes equal contribution)

[3] "Does SGD really happen in tiny subspaces?" **Minhak Song**, Kwangjun Ahn, and Chulhee Yun, Manuscript, 2024. [arXiv:2405.16002]

[2] "Linear attention is (maybe) all you need (to understand Transformer optimization)." Kwangjun Ahn*, Xiang Cheng*, **Minhak Song***, Chulhee Yun, Ali Jadbabaie, and Suvrit Sra, Internation Conference on Learning Representations (**ICLR**), 2024. Short version at **NeurIPS 2023 Workshop** on Mathematics of Modern Machine Learning (**oral presentation**). [Paper] [arXiv:2310.01082]

[1] "Trajectory Alignment: Understanding the Edge of Stability Phenomenon via Bifurcation Theory." **Minhak Song** and Chulhee Yun, Neural Information Processing Systems (**NeurIPS**), 2023. [Paper] [arXiv:2307.04204]

RESEARCH AND WORK EXPERIENCE

KAIST Optimization & Machine Learning Laboratory Jan 2022 – Current
Undergraduate Researcher *Seoul, South Korea*

· Advisor: Prof. Chulhee Yun
· Research Topics: Deep Learning Theory, Optimization

Upstage AI Sep 2022 – Dec 2022
AI Research Engineer Intern *Seoul, South Korea*

· Designed real-time recommendation models using contextual bandit algorithms for e-commerce service

KAIST Applied Artificial Intelligence Laboratory Jun 2021 – Dec 2021
Undergraduate Researcher *Daejeon, South Korea*

· Advisor: Prof. Il-Chul Moon
· Research Topics: Deep Generative Model, Inverse Problem

SELECTED AWARDS AND SCHOLARSHIPS

ICLR 2024 Travel Award 2024

NeurIPS 2023 Travel Award 2023

Korea Presidential Science Scholarship 2020 – Current

· $45,000 financial support for honorable undergraduates from Korean government

KAIST Presidential Fellowship 2020 – Current

· Honor Society of KAIST (Advisor: Prof. Jaeyoung Byeon)
· $30,000 financial support and matching mentor professor
· 28 undergraduates were selected in around 800 freshmen in KAIST

KAIST Alumni Academic Scholarship 2021 – Current

· $15,000 financial support (20 undergraduates in KAIST were selected)

Simon Marais Mathematics Competition, 7th place & Merit Prize 2021

· Merit Prize winner, awarded for creative and insightful work on any problem

Department Valedictorian 2021 Spring, 2021 Fall, 2022 Spring

· Academic scholarship awarded to the top student (ranked #1) among undergraduates

Dean's List 2021 Spring, 2021 Fall, 2022 Spring

· Top 3% of undergraduates with outstanding academic performance

Talent Award of Korea 2019

· Recognizes those individuals who are likely to become Korea's future leaders and have performed exemplary talents or outstanding meritorious service
· 50 high school students, 40 college students, and 10 adults are selected by Korean government

Han Sung Son Jae Han Scholarship for Gifted Students 2018 – 2019

· $10,000 financial support for honorable high school students in South Korea

Korean Young Physicists' Tournament, Grand Prize 2018

TEACHING & ACADEMIC ACTIVITIES

Deep Learning Theory Workshop and Summer School Aug 2022
Summer Cluster: Deep Learning Theory *Berkeley, United States*

· Participant, Simons Institute for the Theory of Computing Workshop

Academic Tutor, KAIST 2021

· Calculus I (2021 Spring), Calculus II (2021 Fall)

PROFESSIONAL SERVICES

- **Conference Reviewer:** NeurIPS 2024

SKILLS

- **Languages:** Korean (mother tongue), English (fluent)
- **Computer Languages & Software:** Python, LaTeX, MATLAB