

# JAEWOOK LEE

## Personal Information

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## Education

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CURRENT	Korea Advanced Institute of Science and Technology M.S. in Artificial Intelligence (Advisor: Prof. Chulhee Yun) GPA: 4.25/4.3	Seoul, South Korea
FEB 2023	Korea Advanced Institute of Science and Technology B.S. in Electrical Engineering & Mathematical Sciences ( <i>Double Major</i> ) GPA: 4.07/4.3, SUMMA CUM LAUDE <i>Graduated with Excellence in Leadership and Volunteer Activity</i>	Daejeon, South Korea
FEB 2018	Sejong Science High School	Seoul, South Korea

## Research Interests

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I am interested in **optimization theory** including both classical convex/nonconvex/stochastic optimization and more practical problem settings in AI including shuffling gradient algorithms, fairness (as constrained optimization), and deep learning theory, especially related to optimization on transformers & diffusion models. Recently I have been particularly interested in **Wasserstein gradient flows** and applications to deep learning theory.

I am also interested in **minimax optimization** and similar topics like control & operator theory and variational inequalities. I am currently focusing on the convergence analysis of first-order minimax optimization algorithms and have been studying broader stuff like multi-player games and multi-agent learning. Currently, I am also working on topics related to **block coordinate descent** which could be thought of as a purely cooperative  $n$ -player game.

## Publications

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- [1] **Jaewook Lee\***, Hanseul Cho\*, Chulhee Yun. Fundamental Benefit of Alternating Updates in Minimax Optimization. *Proceedings of the 41st International Conference on Machine Learning (ICML)*, 2024. **Spotlight**.
- [2] Jaeyoung Cha, **Jaewook Lee**, Chulhee Yun. Tighter Lower Bounds for Shuffling SGD: Random Permutations and Beyond. *Proceedings of the 40th International Conference on Machine Learning (ICML)*, 2023. **Oral**.

\*Equal Contribution.

## Experiences

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<b>Optimization &amp; Machine Learning and Intelligence Lab (OptiML Lab)</b> <b>Research Intern</b> (Advisor: Prof. Chulhee Yun, KAIST GSAI)	JUN 2022 – FEB 2023
<ul style="list-style-type: none"><li>Worst-case convergence lower bounds of gradient-based optimization algorithms</li></ul>	
<b>Machine Learning &amp; Intelligence Lab (MLILAB)</b> <b>Research Intern</b> (Advisor: Prof. Eunho Yang, KAIST GSAI)	JUL 2021 – MAR 2022
<ul style="list-style-type: none"><li>Implemented talking head video generation based on GANs, 3D morphable face models, and neural renderers</li><li>Participated in the MLILAB weekly group paper study (<i>Reading &amp; implementing one paper per week</i>)</li></ul>	
<b>Information Systems Lab (ISL)</b> <b>Research Intern</b> (Advisor: Prof. Changho Suh, KAIST EE)	JAN 2021 – JUN 2021
<ul style="list-style-type: none"><li>Algorithms and theoretical limits for matrix completion problems with graph side-information</li></ul>	
<b>Inference &amp; Information for Data Science Lab (IIDS Lab)</b> <b>Research Intern</b> (Advisor: Prof. Hye Won Chung, KAIST EE)	JUL 2020 – DEC 2020
<ul style="list-style-type: none"><li>Random graphs - Planted clique models and stochastic block models</li></ul>	

## Talks

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- AUG 22<sup>ND</sup>, 2024 **2024 Digital Innovators' Symposium**, Seoul, South Korea  
**Title:** Fundamental Benefit of Alternating Updates in Minimax Optimization
- AUG 13<sup>RD</sup>, 2024 **SNU-KAIST AI/ML Theory Workshop**, Gangneung, South Korea  
**Title:** Exploiting Coordinate Structures in Optimization Algorithms

## Awards & Honors

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- 2024 ICML, **Spotlight Paper**
- 2023 ICML, **Oral Presentation**
- FALL 2021 **Simon Marais Mathematics Competition**, Top Quartile (Rank 16/132)  
*Asia-Pacific undergraduate math contest (Pair with DeukHyeon Kwon)*
- FALL 2021 KAIST MAS, **PoW (Math Problem of the Week)** - 3<sup>rd</sup> Prize  
*Math problem-solving competition for the Fall semester*
- SPRING 2021 KAIST EE, **Dean's List Award**  
*Awarded to top 2% students among all students in EE*
- FALL 2020 KAIST EE, **Academic Excellence Scholarship**  
*Awarded to the top 4 students in EE*
- FALL 2020 KAIST EE, **Dean's List Award**
- FALL 2019 KAIST EE, **Dean's List Award**
- FALL 2018 KAIST, **Freshman Dean's List Award**  
*Awarded to top 2% students among freshmen*

## Professional Services

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**Journal/Conference Reviewer.** JMLR 2024, NeurIPS 2024, ICLR 2024  
**LaTeX Template Engineer.** Officially in charge of the KAIST LaTeX thesis template (2024)

## Teaching Experience

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**KAIST Freshman Tutoring Program.** Calculus II (2020 Fall, 2022 Spring)  
General Physics I (2019 Spring)

## Skills

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**Languages.** English (*Highly Proficient*), Korean (*Native*)  
TOEFL 115/120 (R29/L30/S29/W27), TOEIC 985/990

**Computer Languages.** Python (PyTorch Libraries), MATLAB, LaTeX

## Extracurricular Activities

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- 2023 **Merry Orchestra Original** First Violinist
- 2018-2022 **KAIST Orchestra** First Violinist (2019 Concertmaster)
- 2020-2022 **KAIST CGC (Communication Globalization Committee)**, English Translator
- 2018-2021 **KAIST EDGE (Table Tennis Club)** Member
- 2020-2021 **KAIST UA** Bureau of Welfare & Bureau of International Affairs
- 2020-2021 **KAIST FEEL (EE Conference Camp, [link](#))** Program Director
- 2020 **KAIST 50<sup>th</sup> Anniversary Conference "Pioneers: 2071"**  
Program Director (Scenario Author & Assistant MC)
- 2018-2019 **KAIST FSC (Freshman Student Council)**