Jaewoo Lee

Ph.D. Applicant @ Seoul, Korea
AI Researcher

g-jwlee.github.io
jwlee8877@gmail.com
+82 10-2329-4196

RESEARCH INTERESTS

My goal is to promote AI democratization by developing resource-efficient multimodal models that make AI more accessible and interactive for anyone. Lowering resource barriers and enhancing language and multimodal understanding will broaden AI use for individuals and empower diverse groups to participate in AI development.

- **Multimodal:** Vision-Language, Audio-Visual, Interleaved modalities
- **Efficiency in data & algorithms:** Data selection, Continual learning, Curriculum learning (empirical study)
- **Efficiency in architectures:** Mixture of Experts (MoE), Token reduction
- **Efficiency in systems:** Retrieval-Augmented Generation (RAG), Information retrieval
- **Interpretability:** Interpretable LLM and MLLM, Attribution methods

EDUCATION

Korea Advanced Institute of Science and Technology (KAIST) Seoul, South Korea
Master of Science in Artificial Intelligence (GPA: 3.88/4.3) *Mar. 2023 – Aug. 2024*

- Advisor: Prof. Sung-Ju Hwang
- A half-year early graduation.
- Thesis: Efficient Training Techniques for Multimodal Learning

Korea Advanced Institute of Science and Technology (KAIST) Daejeon, South Korea
Bachelor of Science in Electrical Engineering (GPA: 4.11/4.3) *Mar. 2020 – Feb. 2023*

- Summa Cum Laude.
- A one-year early graduation.
- **Selected Coursework:** Programming Structure, Data Structures and Algorithms, Engineering Random Processes, Introduction to Optimization Techniques, Information Theory, Deep learning for Computer Vision

PUBLICATIONS

* denotes the equal contribution and ˆdenotes the equal advising

[**P1**] **Unified Multi-Modal Interleaved Document Representation for Information Retrieval**
Jaewoo Lee*, Joonho Ko*, Jinheon Baek*, Soyeong Jeong, Sung Ju Hwang
Preprint (submitted to ICLR 2025)

[**C3**] **Concept-skill Transferability-based Data Selection for Large Vision-Language Models**
Jaewoo Lee, Boyang Liˆ, Sung Ju Hwangˆ
Conference on Empirical Methods in Natural Language Processing (EMNLP, 2024)

[**C2**] **STELLA: Continual Audio-Video Pre-training with Spatio-Temporal Localized Alignment**
Jaewoo Lee*, Jaehong Yoon*, Wonjae Kim, Yunji Kim, Sung Ju Hwang
International Conference on Machine Learning (ICML, 2024)

[**C1**] **Sound-based drone fault classification using multitask learning**
Wonjun Yi, Jung-Woo Choi, Jaewoo Lee
International Congress on Sound and Vibration (ICSV, 2023)

RESEARCH EXPERIENCES

DeepAuto.ai Seoul, South Korea
AI Researcher *Aug. 2024 - current*

- Currently working on a layer-wise LLM compression approach to reduce deployment costs.

MLAI Lab-KAIST Seoul, South Korea
Master's Degree Student Researcher (Advisor: Sung Ju Hwang) *Mar. 2023 - Aug. 2024*

- **[P1]** Suggested an information retrieval framework that uses a VLM to integrate interleaved multimodal content within a document into a unified document representation, improving retrieval abilities.
- **[C3]** Proposed a visual instruction tuning data selection method that uses a small model to group data into concept-skill clusters and selects data from each cluster, reducing time costs by 70%.
- **[C2]** Developed an audio-video patch selection method that addresses dynamic multimodal semantics in continual pre-training, continuously adapting to new knowledge while reducing GPU memory consumption by 45%.

Smart Sound Systems Lab-KAIST Daejeon, South Korea
Undergraduate Student Researcher (Advisor: Jung-Woo Choi) *Sep. 2021 - Jun. 2022*

- **[C1]** Introduced a multitask learning approach and audio datasets (link) for UAV anomaly detection.

Urban Robotics Lab-KAIST Daejeon, South Korea
Undergraduate Student Researcher (Advisor: Hyun Myung) *Jun. 2021 - Aug. 2021*

- Worked on Simultaneous localization and mapping (SLAM) for autonomous navigation of self-driving cars.

ACADEMIC SERVICES

- **Reviewer**: Neural Information Processing Systems Workshop on Continual Foundation Model, 2024

AWARDS & HONORS

- **Summa Cum Laude Award** KAIST
  Graduated with highest honors and a 4.11/4.3 GPA. *Feb. 2023*
- **National Scholarship for Science & Engineering** Korea Student Aid Foundation
  Awarded for outstanding academics and potential impact in science and technology. *Sep. 2022 - Feb. 2023*
- **Encouragement Award for the Undergraduate Research Program** KAIST
  Earned a top ranking in the Undergraduate Research Program, competing against 65 teams. *Aug. 2022*
- **College of Engineering Dean's List** KAIST
  Achieved within the top 3% of academic performance in the Electrical Engineering Department. *Aug. 2022*
- **School of Freshman Dean's List** KAIST
  Acheived within the top 2% in academic excellence among Freshman. *Aug. 2020*

SKILLS

Programming Ability - Python, C, MATLAB, Pytorch, Tensorflow, Git, Linux, LaTeX, Markdown
Language Ability - Native in **Korean**, Fluent in **English** (IBT TOEFL: 110)

EXTRACURRICULAR ACTIVITIES

LS Dream Science Class *Dec. 2019 - Feb. 2020*

- Participated in a tutoring program for underprivileged students, teaching science for 6 hours a day for two months.

The Republic of Korea's Army Sergent *Feb. 2018 - Oct. 2019*

- Served as a supply specialist in an armored battalion.
- Promoted to sergeant and corporal one month early, respectively, due to excellence in duty.