Sungmin Kang

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Education

University of Southern California (USC) Los Angeles, United States
M.S. in Electrical and Computer Engineering Aug. 2024 - May. 2026 (Expected)
GPA: 4.00/4.00 *MS Honors Fellow*

Sogang University Seoul, Republic of Korea
B.S. in Electronic Engineering, Micro-degree in Artificial Intelligence Mar. 2018 - Feb. 2024
GPA: 3.91/4.3 *Magna Cum Laude*

Research Interests

· Trustworthy Machine Learning: Uncertainty Estimation for Generative Large Language Models (LLM)
· Scalable Machine learning: Parameter-Efficient Fine-Tuning, Communication-Efficient Federated Learning (FL)

Publications

1. Yavuz Faruk Bakman, Duygu Nur Yaldiz, **Sungmin Kang**, Tuo Zhang, Baturalp Buyukates, Salman Avestimehr, Sai Praneeth Karimireddy, "Reconsidering LLM Uncertainty Estimation Methods in the Wild," **ACL 2025**
2. **Sungmin Kang**, Jisoo Kim, Salman Avestimehr, Sunwoo Lee, "GEM: A Scale-Aware and Distribution-Sensitive Framework for Sparse Fine-Tuning," submitted to **CIKM 2025**
3. Jisoo Kim, **Sungmin Kang**, Sunwoo Lee, "Layer-wise Update Aggregation with Recycling for Communication-Efficient Federated Learning," submitted to **NeurIPS 2025** [paper]

Research Experiences

Graudate Research Assistant, University of Southern California Oct. 2024 - Present
Advisor: *Prof. Salman Avestimehr*, Information Theory and Machine Learning (vITAL) Lab

· Developed an open-source library with 24 methods for evaluating LLM truthfulness [github]
· Evaluated 19 LLM uncertainty estimation methods across threshold sensitivity, robustness, long-form applicability, and ensemble effectiveness

Graudate Research Intern, Inha University May. 2024 - Present
with *Prof. Sunwoo Lee*, Large-Scale Machine Learning Systems Lab

· Designed a communication-efficient FL algorithm that selectively updates high-variability layers by monitoring gradient-to-weight ratio, reducing communication costs by up to 83% while maintaining model accuracy
· Proposed a scale-aware and distribution-sensitive fine-tuning method that prioritizes parameters using gradient-to-weight ratio and selects them via entropy-based masking; achieved 1.5% higher accuracy than full fine-tuning while tuning only 0.1% of total model parameters, outperforming existing SOTA methods

Undergraduate Research Assistant, Sogang University Jul. 2023 - Apr. 2024
Advisor: *Prof. Hongseok Kim*, Networking for Intelligence Computing and Energy (NICE) Lab

· Built a server-client system upon 8 separate devices through wireless socket communication to implement federated learning, enabling server to handle multiple clients by multi-threading [github]
· Designed a FL algorithm that accelerates convergence while maintaining accuracy by predicting the next-step gradient
· Implemented a federated learning algorithm to forecast power in a newly constructed solar power plant in South Korea, deploying the model on four Raspberry Pis

Undergraudate Research Intern, Seoul National University Jan. 2023 - Apr. 2023
with *Prof. Taesup Moon*, Machine Intelligence and Data science (M.IN.D) Lab

· Built a multimodal binary classification model by first training on age prediction using 1796 sMRI images and then fine-tuning it to predict conversion from mild cognitive impairment to Alzheimer's disease
· Achieved a binary classification performance metric (AUROC) of 0.84, effectively addressing label imbalance and data scarcity

Projects

Industry-Academia Collaborative Undergraduate Intern, Sogang Univ. Aug. 2023 - Dec. 2023
with *Prof. Jeung Uk Ha*

· Developed an AI model to fill missing data and classify symptom descriptions of diverse product issues from global branches of Motrex Corporation (an automotive parts manufacturer)
· Led a team of four people to predict future trends using the model, and automate effective graph visualizations

AI Capstone Design Project Course, LG Electronics & Sogang University Spring 2023
with *Prof. Jeung Uk Ha*

· Developed a multimodal image classification model to recognize real-time views from inside moving vehicles in the Unity 3D Game engine
· Designed a voice chatbot that integrates an image classification model to provide real-time information about classified landmarks based on the model outputs [video]

Honors and Awards

Senior Thesis Project Contest, Sogang University Dec. 2023
· 3rd Prize (out of 50 teams, awarded for 'Federated Learning algorithm exploiting consensus ADMM enhanced in solving non-convex optimization problems')

Capstone Design Project Contest, Sogang University Jun. 2023
· 3rd Prize (out of 36 teams, awarded for AI Capstone Design Project)

Daesang Foundation Scholarship Spring 2019 - Fall 2023
· Merit-based scholarships (9M KRW/year) for six semesters

Teaching Experiences

· Grader, EE 503: Probability for Engineers by *Prof. Kosko Bart*, USC Fall 2025 (scheduled)
· Teaching Assistant, EEE 4171: AI Communications by *Prof. Hongseok Kim*, Sogang Univ. Spring 2024
· Teaching Assistant, COR 1010: AI Programming by *Prof. Naeun Jang*, Sogang Univ. Summer 2023
· Education Volunteer Services for financially disadvantaged teenage students 2019, 2021

Work & Leadership Experiences

Administrative Assistant, Sogang Office of International Affairs Sep. 2021 - Aug. 2022
· Provided comprehensive guidance and support for international students, addressing admissions, academic coursework, and daily life matters in Korea

Battalion Senior KATUSA, Camp Hovey Oct. 2019 - May 2021
Served as a Sergeant of KATUSA (Korean Augmentation to the United States Army)
· Managed tasks, training, safety, and daily life of 104 KATUSAs as an elected representative
· Served as an interpreter between Korean and U.S. battalion commanders

Technical & Language Skills

· Programming Languages: Python, MATLAB, C/C++, LaTeX
· iBT TOEFL 115/120