

# Soyeon Bak

Korea University 207 International Center for Converging Technology, 145, Anam-ro, Seongbuk-gu, Seoul, 02841, Korea  
soypark@korea.ac.kr | +82 10 8010 0156 | google scholar | linkedin | github.com/aylameansme

## Education

**Korea University**, Ph.D. Candidate in Artificial Intelligence Mar 2022 – Present

- GPA: 4.22/4.5
- Member of Medical Artificial Intelligence Lab, Korea University (Seoul, South Korea)
- Advisor: Prof. Tae-Eui Kam

**Dongguk University**, B.S. in Statistics Mar 2017 – Feb 2022

- GPA: 3.95/4.5
- **Coursework:** Linear Programming, Stochastic Processes, Mathematical Statistics, Nonparametric Statistics, Design and Analysis of Experiments, Time Series Analysis, Regression Analysis, Actuarial Statistics

## Research Interests

- **Multimodal Large Language Models (MLLMs) for medical visual question answering (VQA)** leveraging images, videos, biosignals, and texts
- **Factual and human-aligned MLLMs in healthcare:** reducing hallucination via multimodal direct preference optimization (mDPO) and parameter-efficient fine-tuning
- **Domain generalization in medical AI:** domain-robust and subject-independent few-shot learning

## Publications

**Connecting the Knowledge Dots: Retrieval-augmented Knowledge Connection for Commonsense Reasoning** May 2025

Junho Kim, **Soyeon Bak**, Mingyu Lee, Minju Hong, Songha Kim, Tae-Eui Kam, SangKeun Lee; *Under review at EMNLP 2025*

**META-EEG: Meta-learning-based class-relevant EEG representation learning for zero-calibration brain-computer interfaces** Jan 2024

Ji-Wung Han\*, **Soyeon Bak**\*, Jun-Mo Kim, WooHyeok Choi, Dong-Hee Shin, Young-Han Son, Tae-Eui Kam; *Expert Systems with Applications, Vol. 238, Part E, 2024* \*Equal contribution

10.1016/j.eswa.2023.121986

**Meta-Learning-based Cross-Dataset Motor Imagery Brain-Computer Interface** Jan 2024

Jun-Mo Kim, **Soyeon Bak**, Hyeonyeong Nam, WooHyeok Choi, Tae-Eui Kam; *IEEE International Conference on Brain-Computer Interface (BCI), 2024*

10.1109/BCI60775.2024.10480445

**SAT-Net: SincNet-Based Attentive Temporal Convolutional Network for Motor Imagery Classification** Jan 2023

Jun-Mo Kim, **Soyeon Bak**, Hyeonyeong Nam, WooHyeok Choi, Da-Hyun Kim, Tae-Eui Kam; *IEEE International Conference on Systems, Man, and Cybernetics (SMC), 2023*

110.1109/SMC53992.2023.10393906

## Research Projects

**Point Language Model: Developing Commonsense and Ethical Reasoning in Large Language Models (LLMs)** Sept 2024 - Present  
Supervised by Prof. SangKeun Lee

- Developed a retrieval-augmented generation (RAG) based LLM for zero- and few-shot commonsense reasoning tasks (Sept 2024 – May 2025)
- Currently building an emotion context benchmark to evaluate LLMs' understanding of complex, real-world affective scenarios (May 2025 – Present)

**Mitigating Visual Hallucination in Medical VQA** Supervised by Prof. Tae-Eui Kam

Mar 2025 – Present

- Clinically-aligned multimodal preference optimization for medical visual question answering, aiming to reduce visual hallucinations in large vision-language models

## Award

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**2nd Place, Algorithm Development – 1st Data Analysis Competition**

Dec 2020

- Organized by Samsung Card Co., Ltd., Korea
- Tool Used: Python

## Technologies

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**Languages:** Python, R

**Technologies:** Linux, Docker, Git, VScode