Bonwoo Koo

kbw9896@kaist.ac.kr

bonwoo-koo9.github.io

Research Interest

- **AI in Healthcare**
- **Wearables**
- **Multi-modal AI**

Education

AUG 2018 - PRESENT

Korea Advanced Institute of Science and Technology (KAIST)

B.S Candidate in Department of Industrial & Systems Engineering (degree expected in Feb. 2026)

AUG 2024 - DEC 2024

Georgia Institute of Technology

Exchange program at GeorgiaTech Industrial & Systems Engineering in Fall 2024

AUG 2014 - MAY 2018

Greengates School

British International School in Mexico City (IB Diploma)

Experience

JAN 2025 - PRESENT (Remote)

AUG 2024 - DEC 2024 (On-site)

Visiting Researcher

GeorgiaTech X Emory Biomedical Engineering, ViTAL Lab (advised by. Hyeokhyen Kwon)

- First-authored a paper on wearable sensor-based detection of neurodegenerative diseases
- Developed an AI-driven framework for analysing multimodal wearable sensor data to detect Mild Cognitive Impairment (MCI) in older adults, using wrist IMU and eye-tracking glasses
- Collected multimodal datasets from 19 older adults (11 with MCI and 8 with Normal Cognition) during a meal preparation task at the Cognitive Empowerment Program, Emory University
- Investigated the association between cognitive decline and both weaker upper limb motor function and delayed eye movements through wrist and eye-tracking data analysis

DEC 2023– JUL 2024

Undergraduate Researcher

KAIST Data Science & Artificial Intelligence Lab (advised by. Chanyoung Park)

- Addressed cross-modality bottlenecks in LLM-based Recommendation Framework using cross-attention mechanism and contrastive learning
- Investigated LLM-based RecSys, including both CF-based LLMRec and Multi-Modal LLMRec
- Explored advancements in RecSys from Collaborative Filtering to Side Information-based Filtering
- Explored advancements in Graph based Recommender Systems and Knowledge Graphs

SEP 2022 - OCT 2023

Undergraduate Researcher
KAIST Financial Engineering Lab (advised by. Woo Chang Kim)

- Co-first authored a paper on deep clustering for financial customer profiling in collaboration with Ph.D. and undergraduate candidates
- Designed a two-stage dimension reduction technique employing Autoencoder, PCA and various Manifold Learning methods, integrated with advanced feature engineering of high-dimensional data
- Led extensive clustering experiments using methods, such as K-means and Hierarchical clustering
- Applied SHAP to enhance cluster explainability and support the design of tailored financial portfolios

Publications

MAY 2025

Quantifying Mild Cognitive Impairments in Older Adults Using Multi-modal Wearable Sensor Data in a Kitchen Environment
Preprint (Submitted to ISWC'25)
Bonwoo Koo, Ibrahim Bilau, Amy D. Rodriguez, Eunhwa Yang, Hyeokhyen Kwon

DEC 2023

Network-based Exploratory Data Analysis and Explainable Three-Stage Clustering for Financial Customer Profiling
Engineering Applications of Artificial Intelligence, SCIE Q1
Insu Choi*, Woosung Koh*, Bonwoo Koo*, Woo Chang Kim

Domestic Conferences

MAY 2023

Improving the Clustering Performance of National Survey of Tax and Benefit Data Using Autoencoder and Dimension Reduction Techniques
Korea Intelligent Information Systems Society (KIISS) Conference
Insu Choi*, Bonwoo Koo*, Woosung Koh*, Woo Chang Kim

NOV 2022

Review of Reinforcement Learning and Recommender Systems in Finance
Korea Institute of Industrial Engineers (KIIE) Conference
Insu Choi*, Bonwoo Koo*, Woosung Koh*, Woo Chang Kim

Awards & Honors

MAY 2024 **2024 South Korea-US STEM Exchange Program Scholarship**
Organization: Korea Institute for Advancement of Technology
Awarded with $9,000 scholarship for the Exchange Program in 2024 Fall at GeorgiaTech

AUG 2023 **2023 KimYoungHan Global Leader Scholarship**
Organization: KAIST Scholarship Organization

DEC 2022 **2022 NH Investment & Securities Big Data Competition – 3rd Place**
Title: Persona based Lifetime Portfolio Management via Autoencoders and Deep Clustering

Language & Additional Skills

Languages: Fluent in Korean and English; Conversational Proficiency in Spanish
Technical Skills: Python, Pytorch, Tensorflow

References

Hyeokhyen Kwon
Assistant Professor, Emory University
Computational Behavior and Health Analytics Lab
hyeokhyen.kwon@emory.edu

Woo Chang Kim
Professor, KAIST
Financial Engineering Lab
wkim@kaist.ac.kr

Chanyoung Park
Assistant Professor, KAIST
Data Science & Artificial Intelligence Lab
cy.park@kaist.ac.kr