Jaehyuk Heo

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Interest

Anomaly Detection, Active Learning,

Education

Seoul National University — Seoul, Republic of Korea
Ph.D. student of Industrial Engineering — *Sep 2024 - Present*
- *Homepage*: http://dsba.snu.ac.kr
- *Advisor*: Pilsung Kang

Korea University — Seoul, Republic of Korea
M.S. of Industrial Management & Engineering — *Mar 2021 - Aug 2024*
- *Homepage*: http://dsba.snu.ac.kr
- *Advisor*: Pilsung Kang

The University of Suwon — Suwon, Republic of Korea
B.S. of Applied Statistics — *Mar 2013 - Aug 2019*
- Major GPA: 4.42/4.5 | Overall GPA: 4.18 / 4.5
- *Advisor*: Jinheum Kim

Experience

CTO — Jul 2024 - Present
TALOS — *Seoul, Republic of Korea*

AI Researcher — Jul 2018 - May 2019
Seoul National University Bundang Hospital — *Seongnam, Republic of Korea*
- *Advisor*: Tackeun Kim
- Study on problem of brain neurological diseases through machine learning

Publications

J: Journal, **C**: Conference, **P**: Preprint & Work In Progress

J7 : **Jaehyuk Heo**, Pilsung Kang*. (2026). "Multi-class Image Anomaly Detection for Practical Applications: Requirements and Proposed Solution." ***Neurocomputing***. **IF: 6.5**, [paper].

J6 : **Jaehyuk Heo**, Jeongseob Kim, Eui Suk Chung, Subin Kim, Pilsung Kang*. (2025). "Normalizing flow-based latent space mapping for implicit pattern authentication on mobile devices." ***Applied Soft Computing***, 169, 112469. **IF: 7.2**, [paper]

J5 : **Jaehyuk Heo**+, Seungwan Seo+, Pilsung Kang*. (2023). "Exploring the differences in adversarial robustness between ViT- and CNN-based models using novel metrics" ***Computer Vision and Image Understanding***, 235, 103800. **IF: 4.886**, [paper]

C1 : **Jaehyuk Heo**, YongGi Jeong, Sunwoo Kim, Jaehee Kim, Pilsung Kang*. (2022). "REVECA: Rich Encoder-decoder framework for Video Event CAptioner". ***Workshop for LOng-form VidEo Understanding Challenge(LOVEU) In CVPR***. [paper | code (★26)]

J4 : Hoonsang Yoon, **Jaehyuk Heo**, Jeongseob Kim, and Pilsung Kang*. (2021). "Text-to-SQL for Korean Language based on Multilingual BERT". ***Journal of the Korean Institute of Industrial Engineers***, 48(1), 91-104. [paper | code (★19)]

J3 : **Jaehyuk Heo**, Sang Jun Park, Si-Hyuck Kang, Chang Wan Oh, Jae Seung Bang, and Tackeun Kim*. (2020). "Prediction of Intracranial Aneurysm Risk using Machine Learning". ***Scientific Reports***, 10(1), 1-10. (SCIE). **IF: 4.418**, [paper]

J2 : Sungjae An, Tackeun Kim*, Chang Wan Oh, Jae Seung Bang, Si Un Lee and **Jaehyuk Heo**. (2019). "Vascular tortuosity of the internal carotid artery is related to the RNF213 c. 14429G> A variant in moyamoya disease". ***Scientific Reports***, 9(1), 1-7. (SCIE) **IF: 4.489**, [paper]

J1 : Tackeun Kim, **Jaehyuk Heo**, Dong-Kyu Jang, Leonard Sunwoo, Joonghee Kim, Kyong Joon Lee, Si-Hyuck Kang, Sang Jun Park, O-Ki Kwon, and Chang Wan Oh*. (2019). "Machine learning for detecting moyamoya disease in plain skull radiography using a convolutional neural network". ***EBioMedicine***, 40, 636-642. (SCIE). **IF: 6.68**, [paper]

PREPRINT & WORK IN PROGRESS

P3 : Kiyoon Jeong+, **Jaehyuk Heo**+, Junyeong Son, Pilsung Kang*. "Domain Adaptation of Attention Heads for Zero-shot Anomaly Detection." Under Review at Computer Vision and Image Understanding.

P2 : **Jaehyuk Heo**, Pilsung Kang*. "Avoid Wasted Annotation Costs in Open-set Active Learning with Pre-trained Vision-Language Model." Under Review at Engineering Applications of Artificial Intelligence.

P1 : KyoungChan Park, **Jaehyuk Heo**, Seungwan Seo, Yonggi Jeong, Pilsung Kang*. "Student-Teacher Framework for Adversarial Example Detection Based on Distortion Information." Under Review at Pattern Recognition Letters.

Projects

[Samsung Electronics] Anomaly Detection for Kitchen Robot–Equipment Systems Jul 2025 - May 2026

- Developed a multimodal anomaly detection model based on log and video data
- Designed a predictive maintenance framework leveraging early anomaly indicators in robot–equipment systems

[Samsung Electronics] Agile Equipment/Process Quality Anomaly Detection Mar 2025 - Feb 2026

- Explored and defined methodologies for analysing and preprocessing equipment operation (FDC) and processing (measurement) data
- Designed and implemented algorithms for quality anomaly detection
- Developed algorithms for quantifying equipment operation and processing quality

[Hyundai] Qualitative Evaluation Prediction Based on a Data Framework Sep 2024 - Aug 2025

- Predicted door opening/closing affective scores from quantitative data without direct expert evaluation
- Developed an algorithm for affective score prediction using spectrum images, enhancing their applicability
- Identified key factors influencing door opening/closing affective scores and analysed their impact
- Simplified workflow and improved efficiency through a UI-based tool

[LG Innotek] Multi-Modal Learning with Tabular and Image Apr 2023 - Feb 2024

- Developed a Multi-Modal Learning model for learning from heterogeneous data
- Applied image–tabular multi-modal learning for cumulative pitch prediction

[Samsung S.LSI] Active Learning–based Defect Data Labelling Framework Mar 2023 - Feb 2024

- Developed a technique to acquire a minimised set of labelled data for detecting new defect types using Active Learning
- Designed a query strategy algorithm that incorporates both uncertainty and diversity for optimal performance
- Deployed a data labelling framework leveraging the proposed Active Learning approach

[NIA & Bflysoft] Fake News Detection May 2022 - Dec 2022

- Developed fake news detection models for two tasks: (1) title and content consistency and (2) consistency within content

[Kakao Bank] Touch Dynamics on Random PIN Pad Nov 2021 - May 2022

- Developed user characteristics classification model using user dynamics data collected from random PIN pad
- Proposed normalizing flow-based user authentication model

[Hanwha System/ICT] Model Development for Predictive Preservation Platform Mar 2021 - Dec 2021

- Established data-based predictive maintenance system to ensure continuity of facility operation
- Built detection system using Isolation Forest that performs fault diagnosis with input variables on actual pattern and generated normal pattern

Teaching Experience

Upstage Oct 2024 - Jan 2025
Boostcamp 7^{th} AI Tech Generative AI Teaching

Upstage Nov 2023 - Apr 2024
Boostcamp 6^{th} AI Tech Generative AI Teaching

LG Energy Solution June 2023 - Jul 2023
Full-time Lecture

Upstage Mar 2023 - Aug 2023
Boostcamp 5^{th} AI Tech CV track Mentor

LG Electronics Feb 2023 - Apr 2023
Full-time Lecture

LG Energy Solution June 2022 - Jul 2022
Teaching Assistant

LG Innotek May 2022 - May 2022
Teaching Assistant

Hyundai Steel Jul 2022 - Aug 2022
Teaching Assistant

SK Hynix May 2022 - May 2022
Project Assistant

Upstage Jan 2022 - June 2022
Boostcamp 3^{rd} AI Tech CV track Mentor