

MINHYEK JEON

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RESEARCH INTERESTS

- Computer Vision, Generative Model, Medical Image Analysis, Clinical AI
- Structural Biology, Molecular Dynamics, Drug Design

EDUCATION

CARNEGIE MELLON UNIVERSITY

Aug.2023 – May.2025

School of Computer Science

Master of Science, Computational Biology

- GPA of 3.97

KOREA UNIVERSITY

Mar.2017 – Aug.2023

Bachelor of Science, Biotechnology

(Military service for 2018-2019)

Bachelor of Engineering, Artificial Intelligence

- GPA of 4.08/4.5

PUBLICATION

Similar but Distinct Comorbidity Patterns Between Polycystic Ovary Syndrome and Endometriosis in Korean Women: A Nationwide Cohort Study

Hye Gyeong Jeong, Minhyek Jeon*, Ki-Jin Ryu, Jina Kim, Yoonjung Yoonie Joo, Hyuntae Park*
JKMS 2024 – Under Revision

Multimodal Integration of Neuroimaging and Genetic Data for the Diagnosis of Mood Disorders Based on Computer Vision Models

Yongwon Cho, Seungeun Lee, Yuyoung Ji, Minhyek Jeon, Aram Kim, Yoonjung Yoonie Joo
Journal of Psychiatric Research Vol 172, 2024

Modeling of Metabolic Syndrome Outbreaks Due to Climate Crisis and Reconsidering the Direction of International Development Cooperation in Eritrea

Yeeun Kim, Yeeun Lim*, Minhyek Jeon*, Sieun Choo, Seongju Kim, other 3 authors*
Journal of Africa Future Society, 2023

Biomedical Data Management, Knowledge Graphs, and Deep Learning

Jędrzej Kubica, Rachit Kumar*, Glenda Hui-En Tan*, Van Q. Truong*, David Enoma, Nicholas P. Cooley, Minhyek Jeon, Other 15 authors*
BioHackrXiv Preprints, 2023

PATENT APPLICATION

***Red Achyranthes Japonica Nakai Root*, 10-2022-0098230 Republic of Korea, 2022**

Invented a novel method of decreasing hemolysis side effects of *Achyranthes japonica* Nakai Root by applying a heat treatment that mainly includes steaming and drying processing methods.

POSTER PRESENTATION

Confidence-guided Semantic Correspondence

The Institute of Electronics and Information Engineers Conference, 2022

Jiwon Kim, Minhyek Jeon, Suhyung Choi, Kyusun Cho, Kwangrok Ryoo, Seungryong Kim

Association between PCOS and EMs by Comorbidity Analysis: The National Health Insurance Service - National Sample Cohort Study

Minhyek Jeon, SeungHyun Nam, Ki-Jin Ryu, Hye Gyeong Jeong, Yoonjung Yoonie Joo, Hyuntae Park
Korea Society for Reproductive Medicine 2022 Spring Conference/2022 Fall Conference

Climate Change and Diabetes: Survey of Eritrea and Recommendations

Minhyek Jeon, Kieun Kwon, Seongju Kim, Ye Eun Lim, Ye Eun Kim, Sieun Choo
Korea Association of International Development and Cooperation, Annual Conference, 2022

RESEARCH EXPERIENCE

Human Sensing Lab Research Intern

Jan.2024 – Now

Advisor: Prof. Fernando De la Torre, Robotics Institute at Carnegie Mellon University

- Augmenting Chest X-ray Images using Latent Diffusion Model

Handled class imbalance problem of Chest X-ray dataset by generating samples by applying various generative models, including DreamBooth, SDEdit, and ControlNet. Focused on enhancing classification accuracy.

David Ryan Koes Lab M.S. Researcher

Jan.2024 – May.2024

Department of Computational and Systems Biology at University of Pittsburgh

- Implicit Transfer Operator Learning Model

Researched simulating molecular dynamics across various time resolutions. Applied denoising diffusion probabilistic models to generate accurate stochastic dynamics to improve computational efficiency.

Jose Lugo-Martinez Lab M.S. Researcher

Sep.2023 – Dec.2023

Computational Biology Department at Carnegie Mellon University

- Detecting Fusion Events of Biomolecule

Worked on developing an automated image analysis pipeline for tracking and merging events of ALT-associated promyelocytic leukemia nuclear bodies.

Robot Intelligence Lab Undergraduate Researcher

Sep.2022 – Dec.2022

Advisor: Prof. Sungjoon Cho, Dept. of Artificial Intelligence at Korea University

- Elevator Recognition Software for Indoor Autonomous Driving Robots

Collaborated with ROBOTIS Co. to develop software enabling robots to detect and use elevator buttons. Employed a two-step hierarchical approach for detection and segmentation, utilizing diffusion and patch augmentation to enhance classification. Software currently used in the product.

Computer Vision Lab Undergraduate Researcher

Dec.2020 – Aug.2022

Advisor: Prof. Seungryoung Kim, Dept. Computer Science and Engineering at Korea University

- Semantic Correspondence Model

Developed effective semi-supervised networks that establish key points match across similar images by using confidence estimation. Handled the intra-class variations and background clutters issue.

SPONSORED GOVERNMENT PROJECTS

Enhancing Satellite Image Object Detectors Using Generative AI

Jan.2022 – Now

Sponsor: United States Department of Defense

Enhanced the generalization of object detectors across diverse geographical regions using generative AI. Adapted detectors using minimal images by fine-tuning Stable Diffusion. Utilized synthetic images generated by ControlNet and GLIGEN to improve object detectors' adaptability and performance.

Public Interest Medical Technology Research Project:

Mar.2022 – Sep.2022

Association analysis between polycystic ovary syndrome and Endometriosis

Sponsor: Ministry of Health and Welfare, Korea Government

Extracted and analyzed 1,025,340 patients' clinical data. Performed phenome-wide association studies or comorbidities to identify conflicting features between polycystic ovary syndrome and endometriosis.

Style transfer network model for conversion of Photographic to Artistic painting

Jun.2022 – Sep 2022

Sponsor: ETRI(Electronics and Telecommunications Research Institute)

Developed a framework to convert photos into artistic paintings to create a new artistic painting database from existing image databases.

WORK EXPERIENCE

Korea University Institute of Data Science Internship, Seoul, Korea *June.2022 - Aug.2023*
Researched gynecology diseases based on the analysis of the patient diagnostic and medical check-up data. Focused on the association between COVID-19 and abnormal uterine bleeding and endometrial pathology.

Department of Radiology Research Internship *Mar.2022 - Feb.2023*
Korea University Anam Hospital, Seoul, Korea
Researched the integration of neuroimaging and genetic factors as potential biomarkers for major depressive disorder. Utilized multimodal fusion of MRI T1 sequences and DNA genotype datasets to develop a multimodal architecture that outperforms unimodal approaches in weakly-supervised learning.

World Federation of United Nations Association *Apr.2022 - Aug.2022*
Headquarters of the United Nations, New York, USA
Worked as a data scientist to analyze the correlation between Eritrea's environmental features and 131 disease types. Utilized machine learning to extract and predict future risk factors.

U21 sustainable Micro-internship, Bangalore, India - online based *Mar.2022 - Apr.2022*
Worked with ICA on driving transformative systemic change through climate action. Focused on SDGs goal 13 and ways to accelerate low-carbon sustainability.

Conscripted Police as an English Specialist, Korea National Police Agency *Apr.2018 - Dec.2019*
Worked as an English interpreter and translator for the official residences of ambassadors from Turkey, Japan, Saudi Arabia, and China, as well as for the Seoul Seongbuk Police Station.

AWARDS & HONORS

Semester High Honors at Division of Biotechnology, Korea University *Jan. 6th, 2022*
2020(2nd Semester), 2022(1st Semester), 2022(2nd Semester)

Future Leaders Scholarship, Korea University *Sep 1st, 2022*
2022(2nd Semester) Partial tuition waived

Award Certificate, Seoul Metropolitan Police Agency *Oct. 21st, 2019*
Received an award for developing a software that automatically organizes work schedules, thus contributing to the development of police administration.

Encouragement Certificate, Security Department, Seongbuk Police Station *Jun. 27th, 2019.*
Received an award for a strong sense of duty and for being an exemplary police officer.

LANGUAGE & TECHNICAL SKILLS

Language

Korean (First language), English (Fluent), German (Intermediate)

Technical skills

Python(Pytorch, Tensorflow), MATLAB, C, C+, GO, R,
Linux, MySQL, SAS, Gephi, Prism, HTML, CSS, Java,
Figma, Adobe Photoshop, Adobe Premiere Pro, AutoCAD

MISC.

Member of MENSA: IQ score: 156 (Top 1% of the general population)

Youth Policy Governance Committee, Seoul Metropolitan Government: Worked on the Youth Policy Governance Committee, identifying the needs of Seocho-gu residents and proposing policy agendas.

FC Gongdori - Football Club: Played as captain and led the team to second place in Korea University football tournament