MINHYEK JEON

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RESEARCH INTERESTS

- Biomedical Imaging, Image Segmentation, Multimodal Clinical Diagnostics, Drug Design
- Computer Vision, Generative Models, Diffusion Models, Text-to-Image Model, Domain Adaptation

EDUCATION

CARNEGIE MELLON UNIVERSITY *Aug.2023 – May.2025*
Master of Science, Computational Biology

• GPA of 4.08/4.33

KOREA UNIVERSITY *Mar.2017 – Aug.2023*
Bachelor of Science, Biotechnology Military Service (2018–2019)
Bachelor of Engineering, Artificial Intelligence

• GPA of 4.04/4.5

PUBLICATION

[p.5] **Models Trained with Unnormalized Density Functions: A Need for a Course Correction**
Minhyek Jeon, *Rishal Aggarwal, Daniel Peñaherrera, Justin Shao, David Koes*
ICLR 2025 BlogPosts (Under Revision; Link to the Blog Post)

[p.4] **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*
Journal of Korean Medical Science Vol 39, 2024 (Acceptance Rate: 20.1%)

[p.3] **Multimodal Integration of Neuroimaging and Genetic Data for the Diagnosis of Mood Disorders Based on Computer Vision Models**
Seungeun Lee, Yongwon Cho*, Yuyoung Ji, **Minhyek Jeon**, Aram Kim, Yoonjung Yoonie Joo*
Journal of Psychiatric Research Vol 172, 2024 (Acceptance Rate: 25%)

[p.2] **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

[p.1] **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

RESEARCH EXPERIENCE

Human Sensing Lab Research Intern *Jan.2024 – Now*
Advisor: Prof. Fernando De la Torre, Robotics Institute at Carnegie Mellon University

• *Enhancing Satellite Image Object Detectors Using Generative AI (Sponsor: U.S. Department of Defense)*

Improved the cross-regional generalization of YOLOv5-based vehicle detection models using generative AI. Implemented domain adaptation strategies and fine-tuned diffusion based image generator to enhance performance. Improved detection model performance by 6% in IoU50 using synthetic data on benchmark dataset. Research is being prepared for submission to ECCV.

• *Augmenting Chest X-ray Images using Latent Diffusion Model*

Addressed class imbalance in Chest X-ray datasets by generating samples through diffusion based models,

including DreamBooth, SDEdit, and ControlNet. Achieved 12.3% improvement in classification accuracy. Research in the process of master's thesis.

David Ryan Koes Lab M.S. Researcher *Jan.2024 – Now*
Department of Computational and Systems Biology at the University of Pittsburgh

• *Designing Generative Model-based Frameworks for Molecular Dynamics Simulations*

[p.5] Conducted research on applying diffusion probabilistic models and flow matching techniques to bypass the computationally intensive molecular dynamics simulation process by directly predicting molecular trajectories across varying temporal resolutions.

Jose Lugo-Martinez Lab M.S. Researcher *Sep.2023 – Dec.2023*
Computational Biology Department at Carnegie Mellon University

• *Segmenting and Tracking Biomolecular Fusion Events from Video Data*

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

• *Developing Elevator Recognition Software for Autonomous Driving Robots (Sponsor: ROBOTIS Co.)*

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 ROBOTIS GAEMI Robot.

Computer Vision Lab Undergraduate Researcher *Dec.2020 – Aug.2022*
Advisor: Prof. Seungryong Kim**,** Dept. Computer Science and Engineering at Korea University

• *Implementing Semantic Correspondence Model for Cross-Domain Image Alignment*

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. Research resulted in an undergraduate thesis.

WORK EXPERIENCE

Korea University Institute of Data Science Research Intern, Seoul, Korea *Jun.2022 - Aug.2023*

• *Public Interest Medical Technology Research Project: Association analysis between polycystic ovary syndrome and Endometriosis (Sponsor: Ministry of Health and Welfare, Korea Government)*

[p.4] Accessed and analyzed clinical data from the Korea University Anam Hospital database. Conducted phenome-wide association studies to identify conflicting comorbidity features between polycystic ovary syndrome and endometriosis.

Department of Radiology Research Intern, Seoul, Korea *Mar.2022 - Feb.2023*
Korea University Anam Hospital

[p.3] Researched the integration of neuroimaging and genetic factors as potential biomarkers for major depressive disorder. Utilized 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, New York, USA *Apr.2022 - Aug.2022*
Headquarters of the United Nations

[p.2] Worked as a data scientist to analyze the correlation between environmental factors in Eritrea and 131 disease types, applying machine learning to predict risk factors. Collaborated with the Eritrean government to launch a pilot project targeting metabolic syndrome.

U21 sustainable Micro-internship, Bangalore, India - online based *Mar.2022 - Apr.2022*

Worked with ICA (Initiative for Climate Action) 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, Seoul, Korea *Apr.2018 - Dec.2019*
Korea National Police Agency

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, 2023*
2020 2nd Semester, 2022 1st Semester, 2022 2nd Semester

Future Leaders Scholarship, Korea University *Sep 1st, 2022*
Awarded tuition waiver for the 2nd semester of 2022

Award Certificate, Seoul Metropolitan Police Agency *Oct. 21st, 2019*
Received an award for initiating and leading a volunteer campaign that provided free Korean lessons to immigrant children, helping them integrate better into society, and contributing to community welfare.

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.

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

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
Selected as **top 4 research** studies and delivered an oral presentation

Confidence-guided Semantic Correspondence
*Youngjo Min, Kwangrok Ryoo, Jiwon Kim, Suhyung Choi, Kyusun Cho, **Minhyek Jeon**, Seungryong Kim*
The Institute of Electronics and Information Engineers Conference, 2022

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

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.