SEO-YOON MOON

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EDUCATION

Carnegie Mellon University, *School of Computer Science* — Aug 2024 - Present
Joint CMU-Pitt Ph.D. Program in Computational Biology — *Pittsburgh, PA*
Ph.D. Student

Seoul National University, *College of Liberal Studies* — Mar 2019 - Aug 2024
B.S. in Computer Science & Engineering — *Seoul, Korea*
B.S. in Cognitive Neural Computation (self-designed major)
Thesis: Zero-Shot Prediction of Task Activation from Resting-State fMRI using 4D Swin Transformer

University of Washington — Mar 2023 - Jun 2023
Exchange Student — *Seattle, WA*

PUBLICATIONS

S. Moon, E. Weinberger, S. Lee, **Towards scalable embedding models for spatial transcriptomics data**, *Machine Learning in Computational Biology*, 2023. [paper][video]

S. Moon*, H. Wang*, H. Kim, K. Kim, W. Ahn, Y. Y. Joo, J. Cha, **Early Life Stress Modulates the Genetic Influence on Brain Structure and Cognitive Function in Children**, *Heliyon*, 2023. [paper]

Y. Y. Joo, **S. Moon**, H. Wang, H. Kim, E. Lee, J. H. Kim, J. Posner, W. Ahn, I. Choi, J. Kim, J. Cha, **Association of genome-wide polygenic scores for multiple psychiatric and common traits in preadolescent youths at risk of suicide**, *JAMA network open*, 2022. [paper]

K. Kim, Y. Y. Joo, G. Ahn, H. Wang, **S. Moon**, H. Kim, W. Ahn, J. Cha, **The sexual brain, genes, and cognition: A machine-predicted brain sex score explains individual differences in cognitive intelligence and genetic influence in young children**, *Human Brain Mapping*, 2022. [paper]

J. Suh, J. Kim, E. Lee, J. Kim, D. Hwang, J. Park, J. Lee, J. Park, **S. Moon**, Y. Kim, M. Kang, S. Kwon, E. Choi, W. Rhee, **Learning ECG Representations for Multi-Label Classification of Cardiac Abnormalities**, *Computing in Cardiology*, 2021. [paper]

$*$: equal contribution

POSTER & ABSTRACTS

S. Moon, E. Weinberger, S. Lee, **Scalable embedding model for spatially-resolved transcriptomics data**, *Allen School Undergraduate and Master's Research Showcase*, 2023, Poster Presentation. [poster]

H. Wang, **S. Moon**, Y. Y. Joo, E. Lee, J. Cha, **Genes, Early Life Stress, Brains, and Cognition: A Moderated Mediation Analysis**, *Biological Psychiatry*, 2021, Poster Presentation. [abstract]

RESEARCH EXPERIENCE

AI for Biomedical Sciences Lab, School of Computer Science and Engineering, UW — Mar 2023 - Oct 2023
Undergraduate Researcher (Advisor: Su-In Lee) — *Seattle, WA*

· Developed scalable graph neural network for spatial transcriptomics

Connectome Lab, Department of Psychology, SNU — Jun 2020 - Dec 2022
Undergraduate Researcher (Advisor: Jiook Cha) — *Seoul, Korea*

- Developed 4D Swin Transformer for predicting task activation map from resting state fMRI.
- Designed and conducted a moderated mediation analysis to investigate the impact of early life stress on children's genes, brain, and cognitive function. Generated genome-wide polygenic score via PRSice-2 for 25 phenotypes.
- Designed and conducted machine learning experiments to investigate the correlation between DNA and suicidality

Artificial Society, Startup Company — Mar 2022 - Jul 2022
AI Researcher (Part-time) — *Seoul, Korea*

- Trained deep learning model for detecting facial landmarks on mobile devices, created metric for evaluating attention levels while reading, as a part of developing a mobile application for dyslexic people.

Applied Data Science Lab, Department of Intelligence and Information, SNU — Jul 2021 - Aug 2021
Undergraduate Researcher (Advisor: Wonjong Rhee) — *Seoul, Korea*

- Extracted features using Fourier transformations to catch peaks and calculate the entropy from biosignal data
- Conducted deep learning experiments using Transformers and CNNs to predict cardiovascular disease from ECG data

PROJECTS

Digital Barrier Free — Jan 2023 - Present

- Led developing Chrome extension for blinded and low-vision people
- Employed optical character recognition (OCR) and image captioning to accommodate enhanced web accessibility to visually impaired people

Data Augmentation Using Feature Attribution in NLP — Sep 2022 - Dec 2022

- Refined Cutoff algorithm (Shen, 2020) using Layer-wise Relevance Propagation (LRP) based feature attribution

Web Project for Real-time Weather Tweets (NowSee) — Sep 2022 - Dec 2022

- Developed an idea of a real-time weather community
- Designed UI & UX and developed front-end (React) and back-end (Django) features

SNU Fast MRI Challenge — Jul 2021 - Aug 2021

- Preprocessed fMRI k-space data and developed MRI super-resolution model using U-Net, CNN, and Vision Transformer to generate full MRI images from under-sampled MRI

SCHOLARSHIP & AWARDS

Forest of Talent, Korea Foundation for Advanced Studies — Mar 2022 - Feb 2024

- Training program for future leaders ($4,000 for scholarship and $8,000 for the 1-year project)

Undergraduate Scholarship, Korea Foundation for Advanced Studies — Sep 2020 - Feb 2022

- Total $6,000 of scholarship

SKILLS

Computer Languages	Python, R, C, Java, JavaScript
Frameworks	Pytorch, Scikit-learn, Huggingface, PyTorch Geometric, React, Django
Data Processing	ECG, Spatial Transcriptomics, fMRI, Natural Language, Image, GWAS
Mathematics	Multivariate Calculus, Linear Algebra, Differential Equations