Sooyoung Kim

Website

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RESEARCH INTERESTS

Computer Vision, Generative AI, Human-AI
I aim to understand and generate dynamic images, including video and 3D computer vision, especially for story-based multimodal media, with inspiration from human visual perception.

EDUCATION

Seoul National University, Seoul, South Korea — Mar 2021 – Aug 2023
M.S. in Brain and Cognitive Sciences (Advisor: Jiook Cha)
Overall GPA: 3.61/4.3 (94.1%)

Ewha Womans University, Seoul, South Korea — Mar 2017 – Feb 2021
B.S. in Computer Science and Engineering
Overall GPA: 3.51/4.3 (92.5%)

RESEARCH IN PROGRESS
(* Equal contribution)

P3. Visual Attention Guidance Enables A Composable Brain-To-Image Decoding
Kim, S.*, Kwon, J.*, Park, M.*, Seo, J., Ro, W., Yoo, S., Kim, S., Lin, Y., & Cha, J.

P2. AesPHA: An Aesthetic PHysics-Aware Neural Style Transfer
Kwon, J.*, **Kim, S.***, Wang, H.*, Lee, J.*, Yoo, S., Lin, Y., & Cha, J.

PUBLICATIONS

P1. Macro2Micro: A Rapid and Precise Cross-modal Magnetic Resonance Imaging Synthesis using Multi-scale Structural Brain Similarity
Kim, S.*, Kwon, J.*, Kwon, J., Bae S., Yoo, S., Lin, Y., & Cha, J.
Preprint, 2024.

C1. AesFA: An Aesthetic Feature-Aware Arbitrary Neural Style Transfer
Kwon, J.*, **Kim, S.***, Yoo, S., Lin, Y., & Cha, J.
AAAI, 2024. 23.75% acceptance rate (2342/12100).

B1. Designing Software Creation: Using UML Diagrams
Published textbook, 2023.

WORK EXPERIENCE

Planningo, Seoul, South Korea — Oct 2024 – Present
AI Researcher (Expected)

- Aim: To develop image harmonization models for commercial photography by resolving the incongruity between AI-generated backgrounds and original advertising photography / commercial videography during synthesis.

Connectome Lab, Seoul National University — Sep 2023 – Present
Research Associate with Prof. Jiook Cha

- Develop a new brain-to-image decoding model **(P3)** that considers both objects placement and identity, enabling a composable brain decoding for the first time.
- Generate a physical Neural Style Transfer framework **(P2)** that understands how brushstrokes work physically on the canvas, based on the AesFA **(C1)**.

Connectome Lab, Seoul National University Jun 2020 – Feb 2021
Undergraduate Researcher with Prof. Jiook Cha

- Considering brain connectivity, utilized Graph Convolutional Networks (GCN) to predict the diagnosis of Obsessive Compulsive Disorder (OCD) by setting the regions of interest in the brain as nodes and their connectivity as edges.
- Resulted in a higher prediction performance compared to traditional machine learning algorithms such as Random Forest.

NLP & Bioinformatics Lab, Ewha Womans University Jul 2019 – Feb 2020
Undergraduate Researcher with Prof. Hyunseok Park

- As an assistant author for a textbook **(B1)**, developed Java codes, drew illustrations, and contributed to the writing to educate Computer Science students at Ewha Womans University based on Java Programming and Unified Modeling Language (UML).
- Studied NLP algorithms predicting the part of speech of words in Genomics and Informatics research papers using Python.

PROJECTS

Affect-Contextualized Perception Decoding with Cross-Species multiscale Neuroscience Foundation Model Sep 2024 – Present

- Lead a team in the decoding project that consists of different laboratories at Seoul National University including Connectome Lab.

AI x Art Hackathon Sep 2024 – Oct 2024

- Designed AI framework that generates video with music using electroencephalogram (EEG) signals for affect, text prompts, and sketches from users recalling memory.

Samsung Advanced Institute of Technology Research Capstone May 2022 – Jun 2022

- Developed a new Image-to-Image Translation model that synthesizes 3D depth maps from 2D Scanning Electron Microscope (SEM) images to ensure that semiconductors are produced as intended leveraging U-Net and Patch GAN.
- Achieved top 20% performance compared to other models measured in Root Mean Squared Error (RMSE).

U.S. DOE National Energy Research Scientific Computing Center (NERSC) Exa-scale Science Application Program (NESAP), remote Jun 2021 – Present

- Advised by Dr. Shinjae Yoo and Dr. Yuewei Lin, conducted multiple computer vision research **(C1, P1, P2, P3)** using super-computers supported by NERSC.

Mitigating Unwanted Background Biases with Background Data Augmentation May 2021 – Nov 2021

- Led a research project that implemented background augmentation techniques using various backgrounds (RGB, black, mean, human-selected) during the training phase to reduce biases in image classification and object detection.
- Achieved 8.49% increasement in accuracy using the mean of backgrounds in classification.

Senior Capstone: A Real-Time Face Detecting AI Surveillance Camera Sep 2019 – Jun 2020

- Designed a capstone project as a leader and developed a smartphone application that identifies individuals' faces in front of a residence and notifies users of the presence of unfamiliar persons in real-time.
- To improve usability and accessibility, utilized Raspberry Pi and Pi camera which are lightweight, inexpensive, and easily attached to the door.

OTHER EXPERIENCE

Server Administrator Jan 2021 – Dec 2021
Seoul National University

- Pioneered the development and management of the lab's first Linux server system at both the user application and operating system levels.
- Conducted in-depth training, including video sessions and workshops, to educate lab members on how to use Linux server and software such as SLURM and Docker.

Tutoring – CS20497: Computer Algorithms Mar 2020 – Jun 2020
Ewha Womans University

- Lectured junior undergraduate students weekly on fundamental and difficult algorithm by preparing supplementary materials and conducting Q&A sessions.

Programming Contest for Female High School Students Nov 2019
Ewha Womans University & Huawei Korea

- Supervised the programming contest and addressed inquiries from students on code and programming environment.

HONORS & AWARDS

Grand Prize at AI x Art Hackathon - $1,000 USD Oct 2024
BrainKorea21 Four Scholarship - $13,627 USD 2021 – 2022
2020 4th Seoul Innovation Challenge - $15,160 USD Jan 2020 – Sep 2020
The 9th Business Plan Contest - $15,160 USD Mar 2019 – Dec 2019
EWHA Scholarship - $586, $606, $178, $303 USD 2018 – 2020
EWHA Merit-Based Scholarship (full tuition) 2017
- Awarded to the top 10% of students upon admission, $4,267 USD

REFERENCES

Jiook Cha
Associate Professor, Department of Psychology, Seoul National University, Seoul, Korea
Research Advisor, Email: connectome@snu.ac.kr

Shinjae Yoo
Deputy Chair, Computational Science Initiative, Brookhaven National Laboratory, Upton, NY, USA
Research Advisor, Email: sjyoo@bnl.gov

Yuewei Lin
Senior Computational Scientist & Foundation Model Group Leader, Computational Science Initiative, Brookhaven National Laboratory, Upton, NY, USA
Research Associate Professor, Stony Brook, NY, USA
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