

Sunghwan Kim

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Research Interests

My research focuses on designing perception models capable of zero-shot generalization using multimodal data. Currently, I am exploring methods to enhance dense vision tasks by leveraging language models.

Keywords: Multi-modality, Perception Model, Zero-shot Generalization

Education

Korea Advanced Institute of Science and Technology (KAIST) Feb 2017-Feb 2021
B.S. in Electrical Engineering and Mathematical Sciences (double major) Advisor: Steven E. Whang
GPA: overall 3.61/4.00; major 3.66/4.00

Korea Science Academy of KAIST Mar 2014-Feb 2017
High school for gifted students in mathematics and science

Publications

2. Texture Learning Domain Randomization for Domain Generalized Segmentation [[paper](#)]
Sunghwan Kim, Dae-hwan Kim, and Hoseong Kim
International Conference on Computer Vision (ICCV), 2023
1. Data Gathering Trials for the Development of Military Imaging Systems [[paper](#)]
Maria Niebla, Duncan L. Hickman, Eunjin Koh, Chanyong Lee, Hoseong Kim, Chaehyoen Lim, **Sunghwan Kim**
SPIE Sensors+Imaging, 2023

Patent

1. Method and System for Detecting Target Using Time Series Images
Chaehyeon Lim, **Sunghwan Kim**, Hoseong Kim, and Eunjin Koh
KR Patent, 2023 (1025640380000)

Work Experience

Agency for Defense Development (ADD) Jun 2021-Present
First Lieutenant and Machine Learning Research Engineer Daejeon, Republic of Korea

- Selected as one of the exclusive 20 military officers in Korea who conduct military service as research engineer at the ADD, Korea's counterpart to U.S. DARPA.
- **Object detection in infrared imagery:** Developed real-time object detection algorithms for defense systems. Generated synthetic infrared imagery for training data and constructed the entire learning pipeline.
- **Model acceleration on edge devices:** Implemented network compression techniques such as knowledge distillation, network pruning, and model quantization to accelerate models on edge devices like NPU.
- **Deep learning-based application software for UAVs:** Developed application software that seamlessly integrates resource optimization by multi-threading, and I/O interfacing with flight control system.

Bluepoint Partners Aug 2020-Mar 2021
Research Assistant Seoul, Republic of Korea

- Bluepoint Partners is an early stage venture capital firm targeting tech sector, such as AI and robotics.
- Supported investments in tech-based startups and conducted market research for these investments.

Neosapience Dec 2017-Feb 2018
Machine Learning Engineer Seoul, Republic of Korea

- Neosapience is a Series B startup that operates deep learning-based audio and video synthesis technology and has launched an AI-powered virtual actor service.
- Conducted data processing for the development of a Korean text-to-speech system.

Research Projects

Agency for Defense Development (ADD)

Machine Learning Researcher

Jun 2022-Present

Daejeon, Republic of Korea

- **Domain generalization in object recognition:** Explored methods for training robust models that learn from synthetically generated source images and perform effectively on diverse real-world images.
- **Language models for enhancing dense vision tasks:** designing semantic segmentation models with domain invariance capabilities, leveraging pre-trained language models.

Korea Advanced Institute of Science and Technology (KAIST)

Undergraduate researcher in Intelligent Network Architecture (INA) lab

Oct 2018-Apr 2019

Daejeon, Republic of Korea

- **Super-resolution on edge devices:** Implemented an algorithm that combines neural super resolution with traditional video codecs to enhance streaming quality on edge devices.

Korea Advanced Institute of Science and Technology (KAIST)

Invited researcher in Center for Axion and Precision Physics Center

Jun 2016-Aug 2016

Daejeon, Republic of Korea

- Researched on the detection of axion using resonant frequency measurements in a cylindrical cavity.

Honor

Korea Army Startup Challenge Gold Prize (\$3000)

Korea Student Aid Foundation (KOSAF) Scholarship (\$1500)

Korea National Scholarship of Science and Technology (\$10000)

KAIST scholarship (Full tuition)

Community Involvement

KAIST Freshman Coach Senior

Feb 2020-Feb 2021

Samsung Semiconductor Education Program and Scholarship

Jun 2019-Present

Research Officers for National Defense (ROND) cadat

Dec 2018-May 2021

KAIST Electrical Engineering Department Student Council

Mar 2018-Feb 2019

KAIST Cyber Tutoring Program

Feb 2018-Jun 2018

KAIST Foreign Buddy Program

Sep 2017-Dec 2017

KAIST Automobile Maker Club

Mar 2017-Aug 2018

Selected Coursework

Electrical Engineering: Deep Learning, Database and Bigdata System, Signal Processing, Computer Architecture, Operating System, Computer Network, Digital System, Electrical Circuits, Electromagnetics

Mathematics: Linear Algebra, Mathematical Analysis, Probability Theory, Statistics, Convex Optimization, Numerical Analysis, Discrete Mathematics, Mathematical Modeling, Differential Geometry, Modern Algebra

Skills

Programming Languages: Python, C/C++, JavaScript, MATLAB

Frameworks & Tools: Pytorch, Tensorflow, NumPy, OpenCV, Docker, Git

References

Dr. Steven E. Whang, Associate Professor at KAIST

Email: swhang@kaist.ac.kr

Dr. Eunjin Koh, Principal Researcher at ADD

Email: eikoda@add.re.kr

Dr. Hoseong Kim, Senior Researcher at ADD

Email: hoseongkim@add.re.kr