Sunghwan Kim

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Research Interests

My research interests are in computer vision, especially efficient algorithms for visual perceptions. Currently, I am exploring methods to leverage pre-trained Foundation Models (FMs) in vision to enhance downstream tasks. Additionally, I am passionate about optimizing vision models with hardware efficiency.

Keywords: Visual Perceptions, Foundation Models, Knowledge distillation, Network Pruning

Education

Korea Advanced Institute of Science and Technology (KAIST) Feb 2017-Feb 2021
B.S. in Electrical Engineering and Mathematics (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
Maria Niebla, Duncan L. Hickman, Eunjin Koh, Chanyong Lee, Hoseong Kim, Chaehyoen Lim, **Sunghwan Kim**
Proc. SPIE Vol. 12737, 2023

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 25 military officers in Korea who conduct military service as research engineer at the ADD, Korea's counterpart to U.S. DARPA.
- Developed real-time object detection algorithms for defense systems, including the construction and processing of infrared imagery datasets, and establishment of the learning pipeline.
- Implemented acceleration for deep learning models on edge devices, such as FPGA boards and NPU, and also developed their associated applications.

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.

Paple Jun 2019-May 2020
Co-founder and Software Engineer Seoul, Republic of Korea

- Paple is a software platform equipped with a community feature that allows for the meta-review of AI papers and the exchange of insights on them.
- Developed the backend using Django and built the database system with MySQL.

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 Experience

Agency for Defense Development (ADD) Jun 2022-Mar 2023
Researcher in missile IR seeker team 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.

Korea Advanced Institute of Science and Technology (KAIST) Oct 2018-Apr 2019
Undergraduate researcher in Intelligent Network Architecture (INA) lab 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) Jun 2016-Aug 2016
Invited researcher in Center for Axion and Precision Physics Center Daejeon, Republic of Korea

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

Patent

1. Method and System for Detecting Target Using Time Series Images
   Chaehyeon Lim, **Sunghwan Kim**, Hoseong Kim, and Eunjin Koh
   KR Patent, 2023 (Reg. Num. 10-2023-0031087)

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 ($5000)

Community Involvement

KAIST Freshman Coach Senior Feb 2020-Feb 2021
Samsung Semicoductor Education Program and Scholarship Jun 2019-Present
Research Officiers 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 Course

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. Hoseong Kim
Senior Reseacher at Agency for Defense Development (ADD), **Email:** hoseongkim@add.re.kr.

Dr. Dae-hwan Kim
Senior Reseacher at Agency for Defense Development (ADD), **Email:** dhkim7@add.re.kr.

Dr. Steven E. Whang
Professor of Electrical Engineering at KAIST, **Email:** swhang@kaist.ac.kr.