Sunghwan Kim

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Research Interests

Computer Vision, Multimodal Learning, Embodied AI, Efficient ML

Education

Korea Advanced Institute of Science and Technology (KAIST) Mar 2017-Feb 2021
Bachelor of Science in Electrical Engineering *Advisor: Steven E. Whang*
Bachelor of Science in Mathematical Sciences
GPA: 3.62/4.3 (92.4/100, 141 credits)

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

Publications

1. **Texture Learning Domain Randomization for Domain Generalized Segmentation** [paper]
   Sunghwan Kim, *Dae-hwan Kim*, *Hoseong Kim*
   International Conference on Computer Vision (**ICCV**), 2023

2. **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*
   Proc. SPIE, Electro-Optical and Infrared Systems, 2023

Works In-preparation

1. **Context-Enhanced Decoder via Language Guidance for Domain Generalized Segmentation**
   Sunghwan Kim, *Byunghyun Pak*, *Byungju Woo*, *Hoseong Kim*
   - Designed a decoder to enhance the capture of contextual information, leveraging pre-trained language models.

Patent

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

Work Experience

Republic of Korea Army (ROKA) Jun 2021-Present
First Lieutenant *Daejeon, Republic of Korea*

- Selected as one of the 20 officers in Korea dedicated to science and technology research for national defense.
- Assigned to ADD, the South Korean counterpart to the U.S. DARPA, for the development of defense technology.
- Mentored a number of junior officers and advised them on their research projects on machine learning.

Agency for Defense Development (ADD) Jun 2021-Present
Machine Learning Engineer *Daejeon, Republic of Korea*

- **Object detection in infrared imagery**: Designed real-time object detection models for UAVs. Generated synthetic infrared images using a 3D engine for training data and established an end-to-end training pipeline.
- **Model acceleration on edge devices**: Implemented model compression techniques such as feature distillation and structural pruning to accelerate ML models on edge devices, including NPU, FPGA board, and edge GPU.
- **ML-integrated software for UAVs**: Developed multi-threading C++ software that optimizes CPU and NPU resources during the inference phase of ML models, interfacing with the flight control system of UAVs.
- **UAVs Flight Test**: Conducted various 3D simulations that emulate actual operation environments, along with real-world flight tests of UAVs, to verify the stability of ML models for deployment.

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

- Bluepoint Partners is an early-stage venture capital firm that invests in deep tech sectors, such as AI and robotics.
- Conducted market analysis on ongoing investments and researched overall technological trends.

Intelligent Network Architecture (INA) Lab at KAIST Oct 2018-Apr 2019
Machine Learning Engineer *Daejeon, Republic of Korea*

- Implemented a real-time super-resolution algorithm that combines ML-based super-resolution with traditional video codecs to achieve real-time capability on edge devices.

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

- Neosapience is a Series B startup that operates an AI-powered virtual actor service specializing in ML-based audio and video synthesis technology.
- Constructed an audio and text pair dataset for training Korean Text-to-Speech models.

Honor

Korea Army Startup Challenge Gold Prize Oct 2021
Korea Student Aid Foundation (KOSAF) Scholarship Mar 2020
Korea National Scholarship of Excellence in Science and Technology Mar 2019-Feb 2021
- Total $ 20,000 (Full-Ride)

National Scholarship for Undergraduate Study Mar 2017-Feb 2019
- Total $ 13,500 (Full-Tuition)

Community Involvement

KAIST Freshman Coach Senior Feb 2020-Feb 2021
Samsung Undergraduate Semiconductor Educational Program (SUSEP) Jun 2019-Present
Research Officers for National Defense (ROND) cadet 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 Big Data System, Signal Processing, Computer Architecture, Operating System, Computer Network, Digital System, Electrical Circuits, Electromagnetics, Physical Electronics

Mathematical Sciences: 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