Sungwon Woo

AI Research Scientist

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PROFILE

I am an alum of Sogang University, where I earned a Master's degree in Artificial Intelligence with a specialization in Computer vision in 2025, advised by Prof. Jongho Nang. I also received my B.S. in Computer Science and Engineering in 2023.
My research lies at the intersection of **computer vision** and **deep learning** – with a special interest on building intelligent visual systems that are beyond supervised learning and data memory efficient; which includes but are not limited to: **continual learning, few-shot learning, self(semi)-supervised learning, image retrieval, and lightweighting**.

EDUCATION

Sogang University *Seoul, Korea*
M.S. in Department of Artificial Intelligence *Mar 2023 - Aug 2025*
- Advisor: Prof. Jongho Nang
- Thesis: *"Neural Collapse-Driven, Uncertainty-Aware Framework for Few-shot Class-Incremental Learning"*[link]

Sogang University *Seoul, Korea*
B.S. in Computer Science and Engineering *Mar 2017 - Feb 2023*
- Graduated with major coursework in Algorithms, Operating Systems, and AI

PUBLICATIONS

Conference

* *Co-first Authors.* † *Corresponding Author.*

Does Prior Data Matter? Exploring Joint Training in the Context of Few-Shot Class-Incremental Learning [link]
Shiwon Kim*, Dongjun Hwang*†, **Sungwon Woo***, Rita Singh†
ICCV Workshop on Continual Learning in Computer Vision (CLVision), 2025.

Relational Self-supervised Distillation with Compact Descriptors for Image Copy Detection [link]
Juntae Kim*, **Sungwon Woo***, Jongho Nang†
IEEE/CVF Winter Conference on Applications of Computer Vision (WACV), 2025.

Semi-supervised learning Knowledge Distillation with feature Augmentation (KDA) [link]
Sungwon Woo, Jeongae Lee, Jung Lee, Hojune Kim, Jinjyeong Bae, Young Choi, Jongho Nang†
Korean Institute of Information Scientists and Engineers (KCC), 2024.

Autoencoder-based CNN LSTM drowsy driving detection model and safe driving system using YOLOv7(5) road front object recognition [link]
Sungwon Woo, Moonhae Kang, Junseok Lee
Korean Institute of Information Scientists and Engineers (KCC), 2022.

Research Projects & Experience

Multimedia System Lab, Sogang University *Seoul, S. Korea*
Graduate Researcher, Undergraduate Intern *Sep 2022 - Aug 2025*

- **Development of Efficient Networks for Image Copy Detection**
  Developed a lightweight network using knowledge distillation to address high computational overhead in image retrieval and copy detection.
  Developed a compact image descriptor that improves database search efficiency and achieves competitive results across diverse benchmarks.

- **Big Data Computing Project**
  Proposed a novel approach that integrates knowledge distillation with a top-k strategy to enhance classification of semi-supervised learning.

- **Capstone Design 2 Project** [video]
  Developed safety features by leveraging road sign object detection to model the surrounding driving environment, and implemented driver drowsiness detection using a CNN-LSTM.

Carnegie Mellon University *Pittsburgh, USA*
Visiting Scholar *Aug 2024 - Feb 2025*

- **A New Benchmark for Few-Shot Class-Incremental Learning: Redefining the Upper Bound** **[report] [video]**
  Introduced a new joint training benchmark tailored for few-shot class-incremental learning by integrating imbalanced learning, and contributed to standardizing inconsistencies in current experimental setups within a unified framework.
  (advised by Prof. Rita Singh)

- **Artificial Intelligence on the Edge with Robotics (AIER)** **[slide] [video]**
  Developed an AI Cannon system on Jetson Orin Nano that detects stationary and moving zombies using an object detection model, determines shooting order through LLM-based speech input, and manages uncertainty by requesting user confirmation for ambiguous targets.
  (advised by Stephen Beck)

- **Invisible Watermarks: Attacks and Robustness** **[report] [video]**
  Improved watermark robustness via cascaded image and latent space techniques, and enhanced attacks with a custom remover network.

Smilegate *Pangyo, S. Korea*
Student Researcher *Jun 2024 - Jul 2024*

- **Generating Yua Han's SNS Images and Reels** **[video]**
  Created virtual human Yua Han's Instagram images and reels video with Dreambooth and Face Reenactment

Awards, Fellowships, & Grants

2025	**Awarded 2nd place (2/34) in the Academic Excellence Award**, CMU	
2024	**Carnegie Mellon University AI Intensive Training Program Fellowship**, IITP	*45,000 USD*
2023-2025	**Smilegate AI Major (DHE) Scholarship**, Smilegate	*7,100 USD per semester*
2023	**5th place on VIdeo Similarity Challenge**, CVPRW2023, VCDW by META	
2022	**4th place on Food Classification Challenge**, KT GenieLabs	

Teaching Experience

Fall 23’ **Discrete Structure(AIE2070-01)**, Teaching Assistant — *Sogang University*

Spring 23’ **Computer Programming I(AIE2050-02)**, Teaching Assistant — *Sogang University*