

Jinyoon Kim

Computer Vision & Machine Learning

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*B.S. Computer Science / Pennsylvania State University
2017-2019, 2022-2024 / GPA: 3.41/4.00*

 [Github Link](#)

 [Website Link](#)

Career Objective

I am a Computer Science graduate specializing in machine learning, dedicated to enhancing technology's ability to understand and interact with our world. My passion lies in advancing research in computer vision technologies and developing architectures that utilize visual information to perform crucial and complex tasks, aiding both everyday users and professionals. Here are the research topics I have specifically worked on or am interested in:

- **Advanced Image Recognition.** From fundamental image recognition models to sophisticated computer vision techniques that achieve higher accuracy and reduce human effort in task execution.
- **Medical Image Diagnosis.** Deeply invested in the medical field, where computer vision can identify patterns in the early stages of diseases, potentially saving patients' lives.
- **Object Perception.** Interested in automated agents accurately understanding object properties, states, and complex inter-object interactions in diverse environments to perform necessary tasks.
- **Innovative Architectures.** Focused on contributing to various aspects of computer vision, from modern neural networks to emerging transformer architectures, dedicating myself to research that benefits society.

For more details on my current projects and research, please visit [my website](#).

Publications

- Jinyoon Kim, Tianjie Chen, Hien Nguyen, and Md Faisal Kabir. **YOLO-SCSA: Enhanced YOLOv8 with Spatially Coordinated Shuffling Attention Mechanisms for Skin Cancer Detection**, International Conference on Machine Learning and Applications 2024 (ICMLA 2024) (*submitted*) [paper | slides | code]
 - **YOLOv8 Integration.** Designed SCSA for integration with YOLOv8 architecture.
 - **Novelty.** Introduced new branches and combination of efficient mechanisms.
 - **Feature Enhancement.** Enhanced feature understanding and performance, especially in smaller models.
 - **Efficiency.** Maintained computational cost and speed close to basic YOLOv8.
 - Tested YOLO-SCSA on HAM10000 skin lesion dataset.
- Jinyoon Kim, Tianjie Chen, and Md Faisal Kabir. **Automated Image Segmentation Using Self-Iterative Training and Self-Supervised Learning with Uncertainty Scores** (Book Chapter Version) [book chapter | slides | code]
 - Tested on PlantVillage dataset and HAM10000 dataset datasets.
 - **Vision Transformer Model.** Also tested with Mask2Former vision transformer model.
 - Book chapter version includes Mask2Former and the HAM10000 dataset.
- Jinyoon Kim, and Md Faisal Kabir. **Automated Data Labeling for Object Detection via Iterative Instance Segmentation**, International Conference on Machine Learning and Applications 2023 (ICMLA 2023) [paper | slides | code]
 - **Auto-Labeling System Development.** Developed an auto-labeling system using YOLOv8's instance segmentation.
 - **Uncertainty-Based Correction.** Combined with an uncertainty-based correction algorithm and iterative training.
 - **Self-Supervised Learning.** System self-applies semi-supervised and active learning methods during training iterations for improved performance.

Current & Future Research Topics

- Participating in the **ISIC 2024 Skin Cancer Detection competition** on Kaggle, developing a high-performance skin lesion classification model. This work will evolve into a research project and be presented at a conference. (*in progress*)
- Future research includes developing architectures and algorithms for detecting fatal tissues in various medical image data beyond skin lesions.
- Planning research on computer vision techniques for various instances to aid automated agents and robots in performing tasks.

Projects

- Jinyoon Kim, Tianjie Chen. **Development of the Skin Cancer Detection Web App for Capstone Project (2023)**
 - Web Application Development. Created a web application for skin cancer detection that users can easily download using PWA, ensuring it can run in any environment accessible to users.
 - YOLO Model Utilization. Utilized YOLOv8 as the baseline detection model and combined datasets from the ISIC skin lesion datasets.
 - Image Preprocessing. Employed algorithms and model pipelines to remove confounding factors such like hairs and dark corners from the image data.
 - Interpretability Techniques. Examined various interpretability techniques such as EigenCAM to visualize crucial image areas and changes in focus due to image preprocessing throughout the pipelines, making the diagnostic process transparent and understandable for users.
- Jinyoon Kim. **Plant Village Demo: Machine Learning Classification on Mobile Application (2023)**
 - Face Recognition System. Built a face recognition system that utilizes fine-tuning of the ResNet neural network.
 - Dimensionality Reduction. Implemented a dimensionality reduction layer to distill highly correlated features for the feature extraction map after the ResNet layers.
- Jinyoon Kim, Aditya Kendre, et al. **Plant Village Demo: Machine Learning Classification on Mobile Application (2023)**
 - Plant Disease Detection. Developed a mobile application that adopts neural networks for detecting plant diseases from input image data on the device.
 - Mobile Neural Network. Utilized MobileNet, fine-tuned for the Plant Village dataset, for the machine learning component of the project.

Awards

- Fulfilled National Ackroyd Healthier Days Scholarship, 2024. I was recognized for a research project aimed at benefiting the health environments of patients, in collaboration with *the Ackroyd Family Foundation and the Penn State community*.
- PennState Computer Science Department Undergraduate Student Award, 2023. Recognized by *the Penn State Computer Science Department* for my participation in the ICMLA 2023 conference.

Service Experiences

- Intern at *K&C Love Consulting Corp.* (June 2024 - Current)
 - Fulfilled national duty of a Korean citizen by serving a national army
 - Explains the empty time between the school enrollment intervals.
- Signal Intelligent Agent - Mandatory Military Service, Republic of Korea (2019-2021)
 - Fulfilled national duty of a Korean citizen by serving a national army
 - Explains the empty time between the school enrollment intervals.