Jinyoon Kim

Computer Vision & Multimodal Learning

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B.S. Computer Science at Penn State
MS Computer Science at University of Virginia
2025-2026

Github Link
Website Link

Career Objective

I am a Computer Science graduate specializing in machine learning, with research interests at the intersection of computer vision, large language models, and reinforcement learning. My focus is on developing multimodal AI systems that integrate visual perception with advanced reasoning capabilities, while also exploring retrieval-augmented approaches that can incorporate external knowledge when beneficial. Motivated by my experience in medical imaging research, I am especially interested in applying these methods to radiology and healthcare, aiming to create systems that go beyond basic perception to support temporal reasoning, knowledge integration, and real-world clinical decision making.

- **Vision–Language Integration:** Designing architectures that combine visual information with language models for richer multimodal understanding and reasoning.
- **Knowledge-Augmented AI:** Investigating methods such as retrieval-augmented generation (RAG) and optional structured knowledge (e.g., graphs) to improve robustness, interpretability, and domain adaptation.
- **Reinforcement Learning in Multimodal Contexts:** Exploring adaptive learning strategies that allow agents to refine decisions through feedback across multiple modalities.
- **Medical AI Applications:** Building models that support healthcare professionals by integrating imaging data with clinical knowledge to improve diagnosis and treatment planning.

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)
  - **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**. In Recent Advances in Deep Learning Applications: New Techniques and Practical Examples, Eds. U. Onyekpe, V. Palade, and M. A. Wani. Chapman and Hall/CRC, 2025. (Book Chapter, Chapter 1).
  - 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)
  - 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

- **Medical AI with Knowledge Integration:** Developing architectures that combine multimodal medical data (e.g., MIMIC-IV EHR and MIMIC-CXR imaging) with retrieval-augmented methods and advanced model designs to improve reasoning and answer generation.
- **Trustworthy and Human-Like AI:** Exploring reinforcement learning and external knowledge incorporation to make large language models more reliable, interpretable, and aligned with human trust.
- **Vision and Multimodal Expansion:** Continuing strong interest in computer vision while extending research to diverse data sources such as brain imaging, physiological signals, and surgical data to advance diagnosis and clinical decision support.

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 – June 2025)
  - Assisted with data preprocessing tasks, including cleaning, organizing, and preparing raw data for analysis.
  - Supported project teams with basic research, documentation, and reporting to streamline workflows.
- 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.