NAHYEON KIM

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1 EDUCATION

University of California, Los Angeles (UCLA) CA, US
M.S. in Mechanical Engineering 2023 - 2024
Thesis Advisor: Prof. Dr. Khalid Jawed, Structures-Computer Interaction Lab

Seoul National University South Korea
B.S. in Mechanical Engineering and B.B.A. in Entrepreneurship 2018 - 2023

2 RESEARCH EXPERIENCE

Adaptive Image Composition of two Diffusion Models South Korea
***Research Engineer (Full time)**, CONNECTEVE.Inc* 2024 - 2025
Advisor: Dr. Prof. Duhyun Ro, Seoul National University

- ◇ Developed a novel framework that integrates and harmonizes the outputs of two DDPM models during the denoising process, enabling realistic and cohesive composite image generation.
- ◇ Introduced a resampling mechanism to control object-background interaction, enhancing adaptability and context awareness.

Self-Supervised Viewpoint Selector for Neural Radiance Fields (NeRF) CA, US
***M.S. student**, Structures-Computer Interaction Lab* 2023 - 2024
Advisor: Prof. Dr. Khalid Jawed), UCLA

- ◇ Maximized the training efficiency of NeRF models by introducing Self-supervised NeRF Image Selection (SNIS), an unprecedented image selection strategy that identifies optimal camera poses.
- ◇ Proposed a novel pseudo-label, analogous to a reinforcement learning reward function, enabling the application of a self-supervised learning framework into NeRF model training
- ◇ Integrated NeRF training with Unity environment-operated cameras, introducing an innovative research methodology to advance NeRF studies.

Visual Positioning System (VPS) with Machine Learning South Korea
***Research Engineer (Full time)**, VR Crew Inc.* 2023

- ◇ Implemented a VPS algorithm for a VR game, estimating user location via mobile device.
- ◇ VPS system includes LiDAR, point cloud analysis, computer vision feature analysis with deep learning, epipolar geometry, homography adaptation.
- ◇ Led research focused on Keypoint Extractor, PnP, PnL, Point Matching, and Global Descriptor.

Knowledge Distillation with Network Inversion, Domain Adaptation South Korea
***Research Internship**, Korea Institute of Science and Technology (KIST)* 2021 - 2022
Advisor: Dr. Prof. Suhyun Kim, KIST Data Science Team

- ◇ Proposed a novel performance restoration method for pruned networks via optimized knowledge distillation loss with synthetic dataset generated by network inversion.
- ◇ Discovered an upper performance limit during training of the pruned network using synthetic data, indicating the current one-hot label format of the network inversion dataset is incorrect, and proposed an alternative vector-form label.
- ◇ Observed domain shrinkage increases performance during pruning and studied domain adaptation to obtain optimal sub-network focusing on the Batch-Normalization layer.

Optical Character Recognition (OCR) South Korea
***Research Internship**, Saige Research Inc.* 2021
Advisor: Dr. Prof. Frank Park, Seoul National University

- ◇ Investigated and customized OCR models to automate manufacturing process.
- ◇ The research investigates bilingual models for Korean and English, encompassing document understanding, custom dataset generation, character detection, and recognition.

3 DEVELOPMENT EXPERIENCE

Junior Software Developer, Datacrunch Global Inc. 2023

- ◇ Developed Business Decision Solution (BDS), a B2B web service that manages and analyzes large amounts of data in logistics centers, tracking inventory flows in warehouses and evaluating marketing methods based on actual user purchases.
- ◇ Mainly worked on API management using Python, Django, React, and MySQL, as a freelance engagement on a project basis.

Software Development Internship, PSX Inc. 2020 - 2021

- ◇ Developed web backend for stock trading platform using Python and Django.
- ◇ Developed the frontend and backend for a prototype of a hybrid application service using React-Native.
- ◇ Established recommendation algorithm for OTT media service that provides content suggestions for users.

4 SELECTED PROJECTS

Comparison Study: Traditional Computer Vision and Deep Learning [Code] 2021

- ◇ Conducted comparative study examining the performance of deep neural networks when augmented with traditional computer vision algorithms: Warping, SIFT, Edge Detection, and Gabor Filters.
- ◇ Creatively utilized the algorithms to enable the first layer of deep neural networks to comprehend the information.
- ◇ Discovered that computer vision algorithms tend to aid deep neural networks more effectively when operating with higher resolutions compared to lower resolutions.

3D Mouse: Spatial Information Inputs
Seoul National University Creative Design Fair 2021

- ◇ Won 3rd prize at the **10th Creative Engineering Design Fair.**
- ◇ Created a 3D mouse equipped with gyro sensors and ultrasonic sensors, provides spatial input to the computer.
- ◇ Implemented and presented a prototype of interactive spatial mouse control service in 3D visualization of the skeletal structure captured through CT imaging.

Spline Visualization and Scene Rendering [Code] 2020 - 2021

- ◇ Designed 3D polygonal objects with B-Spline and Catmull-Rom spline.
- ◇ Created dynamic interaction window via mouse and keyboard controls, showcasing implicit surfaces and objects.
- ◇ Depicted the details of objects using various light sources and Phong illumination, and represented them through ray-tracing.

5 PUBLICATIONS & PATENT

[Submitted] **Nahyeon Kim** and Seyun Kim. "DiffusionMix: Adaptive Image Composition through Merging Two DDPM Denoising Processes.", International Conference on Computer Vision (ICCV) 2025.

[Submitted] **Nahyeon Kim** and Suhyun Kim. "Data-Free Retraining of Pruned Networks.", IEEE Access, 2025.

[Issued] Kim, Nahyeon, 2023, Apparatus and method for performing visual localization effectively, Korean Patent 1020230054544, filed April 26, 2023, and issued December 18, 2023.

6 SKILLS

Programming: Python, C++, MATLAB, React, React-Native, Javascript, Node JS
Scientific Libraries: Pytorch, SciPy, OpenCV, Scikit-Learn, Tensorflow, ROS
Software & Tools: Docker, Singularity, Git, MySQL, Linux OS, LATEX, HTML & CSS, Blender
Domain Knowledge: Neural Radiance Fields (NeRF), Reinforcement Learning, Computer Vision Feature Analysis with ML, Knowledge Distillation, Network Pruning, LLM