Seunghyeon Seo

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EDUCATION

Seoul National University, Seoul, Korea Mar. 2021 ~ Aug. 2025
- Ph.D. in Artificial Intelligence

Seoul National University, Seoul, Korea Mar. 2014 ~ Feb. 2021
- B.A. in Agricultural Economics / Data Sciences

RESEARCH INTERESTS

I am deeply engaged in developing efficient deep learning models for training and inference, aimed at practical real-world applications. Primarily, my research interest focuses on **improving the performance of NeRF and Gaussian Splatting given sparse input data** by various regularization methods, such as exploiting input data distribution, augmenting training rays, designing an effective ray parameterization, etc. In addition, I have recently developed a growing interest in **synthetic data training using generative models**, which further enhances my research focus on data efficiency and model robustness. Beyond these topics, I also maintain a broad curiosity and open-mindedness toward diverse areas of CV/ML/NLP.

WORK EXPERIENCE

Kakao Mobility, Seongnam, South Korea | *Research Scientist* Sep. 2025 ~ Present
- Data Intelligence, DeepAI Team
- Research and development about 3D scene rendering and lane attribute extraction for HD map generation.

Meta Reality Labs, Burlingame, CA | *Research Scientist Intern* May 2025 ~ Aug. 2025
- XRCIA, Datasets (Mentors: John Kim, Lei Xiao, Beibei Liu)
- Research about synthetic egocentric data generation with high-quality body extremities using video diffusion transformer models.
- Leveraged Wan 2.1 video diffusion model with LoRA fine-tuning to adapt generative outputs for egocentric perspectives.

Meta Reality Labs, Burlingame, CA | *Research Scientist Intern* Jul. 2024 ~ Jan. 2025
- XRCIA, Datasets (Mentors: John Kim, Shaojie Bai, Tianyang Ma)
- Research about synthetic data generation using conditional multi-view diffusion models, and training framework of universal face encoder leveraging real+synthetic data.
- Successfully reduced the cost of data collection by over an order of magnitude compared to traditional real-world capture workflows.
- Built a high-quality synthetic dataset used alongside real data to train a universal face encoder, resulting in over 5% improvement on key metrics, surpassing the current best model.

ThinkforBL Consulting Group, Seoul, Korea | *Laboratory Assistant Researcher* Jun. 2020 ~ Nov. 2020
- Development of deep learning-based solutions for agriculture, addressing diverse client requests and implementing models, *e.g.*, posture detection in sows, crop weight classification, and recommendation systems.

Food and Agriculture Organization of the United Nations (FAO), Rome, Italy | *Intern* Sep. 2019 ~ Feb. 2020
- Committee on World Food Security (CFS) (Supervisor: Christopher Hegadorn)
- Research and report on datasets that are relevant to the proposed CFS workstream on <Data Collection and Analysis Tools>.

AWARDS AND SCHOLARSHIPS

Best Doctoral Dissertation Award Honorable Mention Aug. 2025
- Seoul National University

Outstanding Reviewer Award Sep. 2024
- ECCV 2024

Qualcomm Innovation Fellowship Korea 2023 Winner Nov. 2023
- Qualcomm AI Research

Youlchon AI Star Scholarship Aug. 2023
- Youlchon Foundation & AI Institute-Seoul National University

AI Fellowship (Fully Funded) Mar. 2022 ~ Feb. 2023
- Seoul National University

PUBLICATIONS

Conference

[1] Shaojie Bai*, **Seunghyeon Seo***, Yida Wang, Chenghui Li, Owen Wang, Te-Li Wang, Tianyang Ma, Jason Saragih, Shih-En Wei, Nojun Kwak, Hyung Jun Kim, "Generative Head-Mounted Camera Captures for Photorealistic Avatars", ***SIGGRAPH Asia 2025***. **(Journal Track)** **[Project Page]**

[2] **Seunghyeon Seo**, Yeonjin Chang, Jayeon Yoo, Seungwoo Lee, Hojun Lee, Nojun Kwak, "ARC-NeRF: Area Ray Casting for Broader Unseen View Coverage in Few-shot Object Rendering", ***CVPRW 2025***. **(Oral)** **[Project Page]**

[3] Donghoon Han*, **Seunghyeon Seo***, Eunhwan Park, SeongUk Nam, Nojun Kwak, "Unleash the Potential of CLIP for Video Highlight Detection", * indicates equal contribution, ***CVPRW 2024***.

[4] Yeonjin Chang, Yearim Kim, **Seunghyeon Seo**, Jung Yi, Nojun Kwak, "Fast Sun-aligned Outdoor Scene Relighting based on TensoRF", ***WACV 2024***.

[5] Donghoon Han, **Seunghyeon Seo**, DongHyeon Jeon, Jiho Jang, Chaerin Kong, Nojun Kwak, "ConcatPlexer: Additional Dim1 Batching for Faster ViTs", ***NeurIPS 2023 Workshop***. **(Oral)**

[6] **Seunghyeon Seo**, Yeonjin Chang, Nojun Kwak, "FlipNeRF: Flipped Reflection Rays for Few-shot Novel View Synthesis", ***ICCV 2023***. **[Project Page]** **[Code]**

[7] **Seunghyeon Seo**, Jaeyoung Yoo, Jihye Hwang, Nojun Kwak, "MDPose: Real-Time Multi-Person Pose Estimation via Mixture Density Model", ***UAI 2023***. **[Code]**

[8] Jaeyoung Yoo*, Hojun Lee*, **Seunghyeon Seo**, Inseop Chung, Nojun Kwak, "End-to-End Multi-Object Detection with a Regularized Mixture Model", * indicates equal contribution, ***ICML 2023***. **[Code]**

[9] **Seunghyeon Seo**, Donghoon Han*, Yeonjin Chang*, Nojun Kwak, "MixNeRF: Modeling a Ray with Mixture Density for Novel View Synthesis from Sparse Inputs", * indicates equal contribution, ***CVPR 2023***. **(Qualcomm Innovation Fellowship Korea 2023 Winner)** **[Project Page]** **[Code]**

[10] Jongmok Kim, Jooyoung Jang, **Seunghyeon Seo**, Jisoo Jeong, Jongkeun Na, Nojun Kwak, "MUM: Mix Image Tiles and UnMix Feature Tiles for Semi-Supervised Object Detection", ***CVPR 2022***. **[Code]**

[11] Kyuewang Lee*, Inseop Chung*, Daeho Um, Jaeseok Choi, Yeji Song, **Seunghyeon Seo**, Nojun Kwak, Jin Young Choi, "Multi-modal Object Detection, Tracking, and Action Classification for Unmanned Outdoor Surveillance Robots", ***ICCAS 2021***.

Preprint

[1] Yeonjin Chang, Juhwan Cho, **Seunghyeon Seo**, Wonsik Shin, Nojun Kwak, "LoGoColor: Local-Global 3D Colorization for 360 Scenes", Under Review. **[Project Page]**

[2] Yeonjin Chang, Erqun Dong, **Seunghyeon Seo**, Nojun Kwak, Kwang Moo Yi, "ROODI: Reconstructing Occluded Objects with Denoising Inpainters", Under Review. **[Project Page]**

[3] Ingyun Lee, Jae Won Jang, **Seunghyeon Seo**, Nojun Kwak, "DivCon-NeRF: Generating Augmented Rays with Diversity and Consistency for Few-shot View Synthesis", Under Review.

PROJECTS

Research on Novel View Synthesis Using NeRF Trained with Sparse Viewpoint Data

Funded by Samsung Electronics | Main Researcher Jul. 2023 ~ Jul. 2024

- Neural rendering, NeRF, Few-shot learning
- Conducted research to improve the performance of NeRF under sparse input conditions, resulting in a published research paper at a top-tier computer vision conference.

Artificial Intelligence Research about Cross-Modal Dialogue Modeling for One-on-One Multi-Modal Interactions

Funded by Ministry of Science and ICT of Korea | Assistant Researcher May 2022 ~ Jun. 2023

- Multi-modal learning, Object detection
- Assisted in building an object detection system that processes user-submitted images to identify clothing items and extract key attributes.

Development of Real-Time Multi-Camera Object Tracking and Identification Technology

Funded by Electronics and Telecommunications Research Institute | Project Manager Jun. 2021 ~ Dec. 2021

- Multi-object tracking
- Developed a multi-view, multi-object tracking algorithm for real-time vehicle and pedestrian tracking within a parking lot environment.

Development of Multimodal Sensor-Based Intelligent Systems for Outdoor Surveillance Robots

Funded by Ministry of Science and ICT of Korea | Assistant Researcher Jan. 2021 ~ Aug. 2021

- Multi-modal learning, Object detection
- Contributed to a research project on multi-modal object detection, tracking, and action classification for autonomous outdoor surveillance robots.

PATENT

Method and Apparatus based on NeRF using Flipped Reflected Ray, Korean Patent, 10-2024-0022118

SKILLS

Programming Languages

- Python, R, CUDA

ML Development Stack

- PyTorch, Jax, Tensorflow, Slurm, MAST Scheduler

Language

- English (Professional), Korean (Native), French (Basic)

TALK

Generative Head-Mounted Camera Captures for Photorealistic Avatars Jun. 2025

- Meta Reality Labs

Novel View Synthesis from Sparse Inputs via NeRF Apr. 2025

- SNU Haedong Advanced Engineering

ACADEMIC SERVICE

Reviewer for AAAI '25/'26, CVPR '23/'24/'25/'26, ECCV '24, ICCV '25, NeurIPS '25, TCSVT