JINWOO KIM

Ph.D. Student
Graph & Geometric DL

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Education

M.S./Ph.D. in Computer Science — Mar 2021 – present
Korea Advanced Institute of Science and Technology (KAIST) — *South Korea*
• Advisor: Prof. Seunghoon Hong
• Research focus: Deep learning algorithms for graphs and structured data.

B.S. in Computer Science and Brain Engineering (Double Major) — Mar 2016 – Feb 2021
Korea Advanced Institute of Science and Technology (KAIST) — *South Korea*
• GPA 4.05/4.3 **(Summa Cum Laude)**

Publications

(P: preprint, C: conference, J: journal, W: workshop, *: equal contribution)

[C8] **Simulation-Free Training of Neural ODEs on Paired Data**
Semin Kim*, Jaehoon Yoo*, Jinwoo Kim, Yeonwoo Cha, Saehoon Kim, Seunghoon Hong
NeurIPS 2024

[W2] **Revisiting Random Walks for Learning on Graphs**
Jinwoo Kim, Olga Zaghen*, Ayhan Suleymanzade*, Youngmin Ryou, Seunghoon Hong
ICML 2024 Workshop on Geometry-grounded Representation Learning and Generative Modeling

[W1] **Learning Symmetrization for Equivariance with Orbit Distance Minimization**
Tien Dat Nguyen*, Jinwoo Kim*, Hongseok Yang, Seunghoon Hong
NeurIPS 2023 Workshop on Symmetry and Geometry in Neural Representations

[C7] **Learning Probabilistic Symmetrization for Architecture Agnostic Equivariance**
Jinwoo Kim, Tien Dat Nguyen, Ayhan Suleymanzade, Hyeokjun An, Seunghoon Hong
NeurIPS 2023 **(Spotlight Presentation)**

[P1] **3D Denoisers are Good 2D Teachers: Molecular Pretraining via Denoising and Cross-Modal Distillation**
Sungjun Cho, Dae-Woong Jeong, Sung Moon Ko, Jinwoo Kim, Sehui Han, Seunghoon Hong, Honglak Lee, Moontae Lee
arXiv 2023

[C6] **Universal Few-shot Learning of Dense Prediction Tasks with Visual Token Matching**
Donggyun Kim, Jinwoo Kim, Seongwoong Cho, Chong Luo, Seunghoon Hong
ICLR 2023 **(Outstanding Paper Award)**

[C5] **Pure Transformers are Powerful Graph Learners**
Jinwoo Kim, Tien Dat Nguyen, Seonwoo Min, Sungjun Cho, Moontae Lee, Honglak Lee, Seunghoon Hong
NeurIPS 2022

[C4] **Transformers meet Stochastic Block Models: Attention with Data-Adaptive Sparsity and Cost**
Sungjun Cho, Seonwoo Min, Jinwoo Kim, Moontae Lee, Honglak Lee, Seunghoon Hong
NeurIPS 2022

[C3] **Equivariant Hypergraph Neural Networks**
Jinwoo Kim, Saeyoon Oh, Sungjun Cho, Seunghoon Hong
ECCV 2022

[C2] **Transformers Generalize DeepSets and Can be Extended to Graphs and Hypergraphs**
Jinwoo Kim, Saeyoon Oh, Seunghoon Hong
NeurIPS 2021

[C1] **SetVAE: Learning Hierarchical Composition for Generative Modeling of Set-Structured Data**
Jinwoo Kim*, Jaehoon Yoo*, Juho Lee, Seunghoon Hong
CVPR 2021

[J1] **Spontaneous Retinal Waves Can Generate Long-Range Horizontal Connectivity in Visual Cortex**
Jinwoo Kim*, Min Song*, Jaeson Jang, Se-Bum Paik
The Journal of Neuroscience 40(34) 2020

Work Experience

LG AI Research Fundamental Research Lab (FRL) Jan – Jul 2022
Research Intern (Mentors: Prof. Moontae Lee, Prof. Honglak Lee) *South Korea*
• Published 3 papers at NeurIPS & ECCV on transformers for graphs [C5, C3] and efficient transformers [C4].

KAIST Vision and Learning Lab 2020
Undergraduate Research Intern (Mentors: Prof. Seunghoon Hong, Prof. Juho Lee) *South Korea*
• Published a paper at CVPR [C1] on transformer-based hierarchical variational autoencoders for sets.

KAIST Visual Systems Neural Network Lab 2018 – 2019
Undergraduate Research Intern (Mentor: Prof. Se-Bum Paik) *South Korea*
• Published a paper at JNeuro [J1] on a computational model of the prenatal wiring of the visual cortex.

Korea Institute of Basic Science (IBS) Social Neuroscience Group 2017
Undergraduate Research Assistant (Mentor: Dr. Doyun Lee) *South Korea*
• Assisted research on ensemble perception of motion.

Honors & Awards

ELLIS Mobility Grant (€800) 2024
ICML Workshop on Geometry-grounded Representation Learning and Generative Modeling
• For Random Walk Neural Networks (ICML 2024 GRaM Workshop) [W2].

ICLR Outstanding Paper Award 2023
International Conference on Learning Representations (ICLR)
• As a coauthor of Visual Token Matching (ICLR 2023) [C6].

Samsung Humantech Paper Award Silver Prize ($7,000) 2023
Samsung Electronics Co., Ltd.
• As a coauthor of Visual Token Matching (ICLR 2023) [C6].

Kwanjeong Education Foundation Scholarship ($20,000) 2022 – 2023
Kwanjeong Educational Foundation

Qualcomm Innovation Fellowship Korea ($4,000) 2022
Qualcomm Technologies, Inc.
• For Higher-order Transformers (NeurIPS 2021) [C2].

KAIST Undergraduate Research Program Excellence Award 2022
Korea Advanced Institute of Science and Technology (KAIST)
• As a mentor for the undergraduate research project by Tien Dat Nguyen.

KAIST Engineering Innovator Award 2020
Korea Advanced Institute of Science and Technology (KAIST)
• Granted to 5 undergraduate students for outstanding achievements.

Korea National Science & Technology Scholarship ($13,000) 2018 – 2019
Korea Ministry of Science and ICT

KAIST Alumni Fellowship ($12,000) 2017 – 2020
Korea Advanced Institute of Science and Technology (KAIST)

KAIST Presidential Fellowship ($10,000) 2016 – 2020
Korea Advanced Institute of Science and Technology (KAIST)

KAIST Dean's List 2016 – 2018
Korea Advanced Institute of Science and Technology (KAIST)
• Awarded for outstanding academic performance 3 times (spring 2016, fall 2016, spring 2018).

Hansung Scholarship for Gifted Students ($10,000) 2015 – 2016
Hansung Sonjaehan Scholarship Foundation

Skills

Languages: English (Conversational), Korean (Native), Japanese (Introductory)
Programming Languages: Python, C, C++ R, MATLAB
Deep Learning Frameworks: PyTorch, Lightning, PyG, Transformers, JAX, CUDA
Miscellaneous: Linux, Git, Docker, LaTeX, Markdown, Adobe Illustrator

Invited Talks

Learning probabilistic symmetrization for architecture agnostic equivariance (on [C7])
@ *Sungkyunkwan University (SKKU) (Host: Chang Woo Myung)* Aug 2024
@ *Pohang University of Science and Technology (POSTECH) (Host: Sungsoo Ahn)* Nov 2023

Universal few-shot learning of dense prediction tasks with visual token matching (on [C6])
@ *KAIST–Samsung Electronics DS Division Exchange Meetup (Host: Chulmoo Kang)* Aug 2023

Pure transformers are powerful graph learners (on [C5])
@ *Microsoft USA (Host: Nabiha Asghar)* Jan 2023
@ *NeurIPS 2022 at KAIST (Host: Dongkwan Kim)* Nov 2022
@ *Learning on Graphs and Geometry Reading Group (LoGaG) (Host: Hannes Stärk)* Aug 2022

Higher-order transformers for sets, graphs, and hypergraphs (on [C2])
@ *Qualcomm Korea (Host: Jaewon Choi)* Jan 2023
@ *KAIST AI Workshop 21/22 (Host: Dongkwan Kim)* Jan 2022
@ *NeurIPS 2021 Social: ML in Korea (Host: Jung-Woo Ha)* Dec 2021

Hierarchical variational autoencoders for generative modeling of sets (on [C1])
@ *Naver AI Author Meetup for CVPR 2021 (Host: Jung-Woo Ha)* Sep 2021
@ *Korean Conference on Computer Vision 2021 (Host: Jongwoo Lim)* Sep 2021

Retinal waves and prenatal wiring of the primary visual cortex (on [J1])
@ *Society for Neuroscience, Chicago, IL, US* Oct 2019

Teaching

Teaching Assistant, *KAIST School of Computing*
- Undergraduate Research Program (URP) 2022, 2024
- Introduction to Deep Learning (CS492I) 2021, 2022, 2023
- Computer Vision (CS576) 2022, 2023
- School of Computing Colloquium (CS966/CS986) 2021

Teaching Assistant, *Samsung Electronics*
- Samsung Research AI Expert Program 2021–2024

Student Mentoring and Collaboration
- Jiyun Park, B.S. Student @ KAIST 2024 – present
- Nicole Shen, B.S. Student @ MIT 2024 – present
- Youngmin Ryou, B.S. Student @ KAIST (on [W2]) 2023 – present
- Semin Kim, M.S. Student @ KAIST (on [C8]) → Ph.D. Student @ KAIST 2023 – 2024
- Ayhan Suleymanzade, B.S. Student @ KAIST (on [C7, W2]) 2023 – 2024
- Olga Zaghen, M.S. Student @ UniTrento (on [W2]) → Ph.D. Student @ UvA Amsterdam 2023
- Tien Dat Nguyen, B.S. Student @ KAIST (on [C5, C7, W2]) → M.S. Student @ UWaterloo 2021 – 2023
- Ali Ahmed Sheikh, B.S. Student @ KAIST 2023
- Hyeokjun An, M.S. Student @ KAIST (on [C7]) 2023
- Daniel Sungho Jung, B.S. Student @ Penn State → Ph.D. Student @ SNU 2021
- Saeyoon Oh, B.S. Student @ KAIST (on [C2, C3]) → Engineer @ FuriosaAI 2021

Academic Services

Conference Reviewer: NeurIPS 2022–2024, ICML 2023–2024, LoG 2022–2024, ICML GRaM Workshop 2024, CVPR 2022, ACCV 2022
Journal Reviewer: Neural Networks 2023, TMLR 2024

Projects

Extending Language Models for Physical Data Understanding 2024 – 2025
Korea National Research Foundation (NRF)
Image Inpainting with Visual Commonsense Reasoning 2021 – 2023
Korea Ministry of Science and ICT
Cooperative Intelligence for Heterogeneous Robots 2021 – 2023
Korea National Research Foundation (NRF)

References

Prof. Seunghoon Hong, Associate Professor at KAIST seunghoon.hong@kaist.ac.kr