

Hojoon Lee

AI RESEARCHER

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Research Interests

I'm passionate about developing embodied AI that can continuously learn and adapt in dynamic environments. I envision foundation models acting as the "brain," capturing vast general knowledge and planning long-term strategies. Then, these strategies can be executed by small, specialized agents. To do so, I am particularly interested in:

- (i) Finding efficient frameworks to integrate foundation models into embodied systems that enhance cognitive capabilities.
- (ii) Designing scalable, compute- and sample-efficient RL algorithms to develop small, task-specific policies.

Education

KAIST

M.S / PH.D. STUDENT IN AI, ADVISED BY PROF. JAEGUL CHOO

Seongnam, Korea

Mar.2020 - Present

Korea University

B.S IN COMPUTER SCIENCE

Seoul, Korea

Mar.2014 - Feb.2020

Work

Sony AI

RESEARCH INTERN

- Developing a vision-based autonomous racing agent in a realistic simulator using reinforcement learning.
- Mentor: Takuma Seno, Kaushik Subramanian, and Peter stone.

Tokyo, Japan

Feb.2024 - Aug.2024

KakakEnterprise

AI RESEARCH INTERN

- Built an open-source reinforcement learning framework, Jorlady (300+ ☆).

Seongnam, Korea

Sep.2021 - Feb.2022

Neowiz

AI RESEARCH INTERN

- Develop a reinforcement learning agent that can play a turn-based strategy game, BrowndustZero.

Seongnam, Korea

Mar.2019 - Jul.2019

Selected Publications

SimBa: Simplicity Bias For Scaling Up Parameters in Deep Reinforcement Learning

Preprint

- **Hojoon Lee***, Dongyoon Hwang*, Donghu Kim, Hyunseung Kim, Jun Jet Tai, Kaushik Subramanian, Peter R.Wurman, Jaegul Choo, Peter Stone, Takuma Seno
- Designing network architectures that steer convergence toward simple functions allows for scaling up parameters in RL.

Slow and Steady Wins the Race: Maintaining Plasticity with Hare and Tortoise Networks

ICML'24

- **Hojoon Lee**, Hyeonseo Cho, Hyunseung Kim, Donghu Kim, Dugki Min, Jaegul Choo, Clare Lyle
- To maintain network plasticity, we introduce Hare and Tortoise networks, imitating the hippocampus and neocortex of the brain.

PLASTIC: Enhancing Input and Label Plasticity for Sample Efficient Reinforcement Learning

NeurIPS'23

- **Hojoon Lee***, Hanseul Cho*, Hyunseung Kim*, Daehoon Gwak, Joonkee Kim, Jaegul Choo, Se-Young Yun, Chulhee Yun
- Construct a sample-efficient RL algorithm by preserving the model's input & label plasticity throughout training.

Honors & Awards

Travel Award (\$3,000 as awards), Crevisse Partners, 2023.

SIGIR Best Short Paper Honorable Mention, 2022.

Korea Government Full Scholarship (\$10,000 per year), Ministry of Science and ICT of Korea, 2020, 2021.

2nd place (\$2,000 as awards), Korea University Graduation Project Competition, 1st & 2nd Semester, 2019.

College Scholarship (\$4,000 credit as awards), Seongnam Scholarship Foundation, 2017.

Eight Army General Paik Sun Yup Leadership Award, LTG Thomas.S.Vandal, U.S Army, 2017.

Technical-Skills

Proficient Git, Python, PyTorch, Tensorflow, Jax

Experience C, Docker, SQL, Hadoop

Languages

English Fluent

Korean Native

Academic Service

Reviewer Neurips'23-24, ICLR'24-25, ICML'24, AAAI'24

Publications

SimBa: Simplicity Bias For Scaling Up Parameters in Deep Reinforcement Learning

Preprint

- **Hojoon Lee***, Dongyoon Hwang*, Donghu Kim, Hyunseung Kim, Jun Jet Tai, Kaushik Subramanian, Peter R. Wurman, Jaegul Choo, Peter Stone, Takuma Seno
- Designing network architectures that steer convergence toward simple functions allows for scaling up parameters in RL.

Do's and Don'ts: Learning Desirable Skills with Instruction Videos

NeurIPS'24

- Hyunseung Kim, Byungkun Lee, **Hojoon Lee**, Dongyoon Hwang, Donghu Kim, Jaegul Choo
- We present DoDont, a skill discovery algorithm that learns diverse behaviors while following the instruction videos.

Slow and Steady Wins the Race: Maintaining Plasticity with Hare and Tortoise Networks

ICML'24

- **Hojoon Lee**, Hyeonseo Cho, Hyunseung Kim, Donghu Kim, Dugki Min, Jaegul Choo, Clare Lyle
- To maintain network plasticity, introduce Hare and Tortoise networks, imitating the hippocampus and neocortex of the brain.

Investigating Pre-Training Objectives for Generalization in Vision-Based RL

ICML'24

- Donghu Kim*, **Hojoon Lee***, Kyungmin Lee*, Dongyoon Hwang, Jaegul Choo
- Investigate which pre-training objectives are beneficial for out-of-distribution generalization in visual RL.

Adapting Pretrained ViTs with Convolution Injector for Visuo-Motor Control

ICML'24

- Dongyoon Hwang*, Byungkun Lee*, **Hojoon Lee**, Hyunseung Kim, Jaegul Choo
- Introduce an add-on convolution module for ViT which injects locality and translation equivariant biases.

PLASTIC: Enhancing Input and Label Plasticity for Sample Efficient Reinforcement Learning

NeurIPS'23

- **Hojoon Lee***, Hanseul Cho*, Hyunseung Kim*, Daehoon Gwak, Joonkee Kim, Jaegul Choo, Se-Young Yun, Chulhee Yun
- Construct a sample-efficient RL algorithm by preserving the model's input & label plasticity throughout training.

Learning to Discover Skills through Guidance

NeurIPS'23

- Hyunseung Kim*, Byungkun Lee*, **Hojoon Lee**, Dongyoon Hwang, Kyushik Min, Sejik Park, Jaegul Cho
- Develop a skill-discovery algorithm based on the spirit of the Go-Explore algorithm.

On the Importance of Feature Decorrelation for Unsupervised Representation Learning in RL

ICML'23

- **Hojoon Lee**, Gwanho Lee, Dongyoon Hwang, Hyunho Lee, Byungkyeun Lee, and Jaegul Choo
- Develop a self-predictive representation learning method from video for reinforcement learning.

ST-RAP: A Spatio-Temporal Framework for Real Estate Appraisal

(short) *CIKM'23*

- **Hojoon Lee***, Hawon Jeong*, Byungkun Lee*, and Jaegul Choo
- Propose a novel real estate appraisal framework that integrates a real estate's spatial and temporal aspects.

Towards Validating Long-Term User Feedbacks in Interactive Recommender System

 (short) *SIGIR'22*

- **Hojoon Lee**, Dongyoon Hwang, Kyusik Min, and Jaegul Choo
- Analyze the existence of long-term effects in reinforcement learning-based interactive recommender systems.

DraftRec: Personalized Draft Recommendation for Winning in MOBA Games

WWW'22

- **Hojoon Lee***, Dongyoon Hwang*, Hyunseung Kim, Byungkun Lee, and Jaegul Choo
- Develop a personalized champion recommendation system in *League of Legends* with a hierarchical transformer architecture.