Seungeun Rho

RESEARCH INTERESTS

Deep Reinforcement Learning, Robot Learning, NLP, RL from Human Feedback, Unsupervised RL

EDUCATION

Georgia Institute of Technology 2023 -
- Ph.D. in Computer Science, advised by Dr. Sehoon Ha
- Teaching Assistant in computer animation class (CS4496)

Seoul National University 2017
- M.S. in Machine Learning, advised by Dr. Wonjong Rhee

Seoul National University 2015
- B.S. in Computer Science & Economics
- The President of the Student Council for the *College of Liberal Arts* in 2012

INDUSTRY

Kakao Brain, South Korea 2021 - 2023
ML Researcher
- Kakao Brain is one of the top ML research companies in Korea
- Worked in the field of both RL and NLP

NCSOFT, Game AI Lab, South Korea 2017 - 2020
RL Researcher

PUBLICATIONS

[1] **Efficient Latent Variable Modeling for Knowledge-Grounded Dialogue Generation**
Han, G., Jo D., Nam, D.W., Yoon, E., Kwon, T., Rho, S., On, K., Yoo, C.D., Kim, S. *EMNLP Findings*, 2023.

[2] **LECO: Learnable Episodic Count for Task-Specific Intrinsic Reward**
Jo, D., Kim, S., Nam, D.W., Kwon, T., Rho, S., Kim, J., Lee, D. *NeurIPS*, 2022.

[3] **Creating Pro-level AI for a Real-Time Fighting Game Using Deep Reinforcement Learning**
Oh, I., Rho, S., Moon, S., Son, S., Lee, H., Chung, J. *AAAI Workshop on RL in Games*, 2021.

[4] **Data Requirements for Applying Machine Learning to Energy Disaggregation**
Shin, C.*, Rho, S.*, Lee, H., & Rhee, W. *Energies*, 12(9), 1696. 2019.

*: co-first author
Google Scholar

RESEARCH EXPERIENCE

Georgia Institute of Technology 2023 - Present

- Ongoing Project 1 - Training agile locomotion for quadrupedal robots using human drawing guidelines
- Ongoing Project 2 - Unsupervised skill discovery with human preference

Kakao Brain 2021 - 2023

- NLP
  - Proposed an approach to co-train the knowledge retriever and response generator together for improving knowledge-grounded dialogue generation [1]
- Distributed RL codebase
  - Developed and released *BrainAgent*, a massive throughput scalable RL codebase
  - It can produce and train 34k frames per sec, given 16 GPUs & 384 CPU cores
  - On top of the *BrainAgent*, we implemented TrXL core, V-trace, and PopArt algorithm
  - Succeeded to **reproduce SOTA on DMLab30** multitask training environments
- Exploration in RL
  - Introduced *LECO*: Learnable hash based Episodic Count. paper[2]
  - *LECO* uses VQ-VAE based hash code for state novelty, and the novelty is regulated by the task-specific modulator
  - Significantly outperforms previously state-of-the-art exploration methods on MiniGrid and DMLab30 environments

NCSOFT 2017 - 2020

- Multi-agent RL
  - Aims to find practical RL approach to train ~50 agents in cooperative game
  - Agents demo in both StarCraft2 environments and the game
- Self-play RL in simultaneous games
  - Aims to train super-human level AI in 1v1 simultaneous game
  - To find Nash Equillibrium strategy, WE proposed novel self-play curriculum that guarantee agent diversity
  - Final agent trained with 3 GPUs & 600 CPU cores for two weeks, beat pro-player: paper[3]

HONORS & AWARDS

RL Competition Honors 2020-2022

- **NeurIPS'22,** IGLU Challenge RL Track
  - Both 1st place winner & research prize winner
  - The task is about training agents that can follow natural language instructions to build a target structure - link

- **Google Research & Manchester F.C**., Football AI Competition
  - 6th / 1,138 (top 0.5%). Won gold medal
  - Our approach and code

- **Kaggle**, HungryGeese RL Competition
  - 44th / 875 (top 5%). Won silver medal

Scholarship Awards

- **Teaching Assistant Scholarship**, in graduate school of SNU 2017
- **National Research Foundation of Korea**, BrainKorea21 research scholarship 2015-2017
- **National Scholarship for Sci. and Eng.**, for students with academic excellence 2012-2013
- **Seoul National University**, scholarship for superior academic performance 2010-2011

National Korea Physics Olympiad

- High school senior part, won silver medal 2009
- High school part, top 50 finalist 2007
- Middle school part, won gold medal 2006

PROJECTS

Book Publication 2020

- Published a book named "*Reinforcement learning from basic*, Rho, S., 2020" in Korean
- The book introduces about the basic concepts of RL and bridge between RL and deep learning
- ISBN13 : 9788931463170 / ISBN10 : 8931463170

Github Repository - MinimalRL 2019

- Minimal implementations of basic deep RL algorithms: github repository (★2.6K+)
- Including PPO, SAC, DQN, ACER, A2C, A3C, V-Trace, …

RELEVANT COURSEWORK

Graduate

- **A+** in Convex Optimization, Information Retrieval, Machine Learning, Introduction to Data Analysis, Neural Networks, Advanced Research Project in Data Science
- **A0** in Learning Deep Neural Networks, Neural Networks Practice

Undergraduate

- **A+** in Linear Algebra, Principles of Programming, Creative Research Seminar, Logic and Critical Thinking
- **A0** in Algorithms, Discrete Mathematics, Physics1, Physics Lab1, Mathematics for Economics, Electrical and Electronic Circuits