

HYUNJAE WOO

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RESEARCH INTERESTS

My research interest is in the intersection of deep learning and reinforcement learning (RL) and its various real-world applications such as robotics. Specifically, I am interested in building efficient and task-agnostic intelligent machine through hierarchical RL and meta-learning.

EDUCATION

University of Michigan - Ann Arbor

Sep 2013 - Present

B.S.E. in Computer Science & Engineering

(resolved the duty for military service: 2014 - 2015)

PUBLICATIONS

Meta Reinforcement Learning with Autonomous Task Inference

Sungryull Sohn, **Hyunjae Woo**, Jongwook Choi, Honglak Lee

Deep RL Workshop on Neural Information Processing Systems (NeurIPS), 2019

RESEARCH EXPERIENCE

Deep Learning Lab @ Univ. of Michigan

Oct 2018 - Present

Undergraduate Research Assistant

Advisor: Honglak Lee

- Implemented various RL baseline models such as hierarchical A2C algorithm using PyTorch and meta-evaluated the baselines against novel *meta-hierarchical RL agent with autonomous task inference module* on challenging RL environments such as StarCraft II Learning Environment (SC2LE) and The House Of interActions (THOR). The work is accepted at the **Deep RL Workshop on NeurIPS 2019** and under review at **ICLR 2020**.
- Developed challenging game scenarios with complex and hierarchical dependencies in SC2LE

Univ. of Michigan Transportation Research Institute

Jan 2019 - May 2019

Undergraduate Research Assistant

Advisor: Byoung-Keon (Daniel) Park

- Developed a stable version of TCP packet reader in C# that uses Pcap.Net (.NET wrapper for WinPcap) to convert TCP packets into CSV files.
- Collected various LiDAR datasets (TCP packets) for several road lanes with different materials to measure their robustness against severe weather conditions over time in Michigan.

Reinforcement Learning Lab @ Univ. of Michigan

Oct 2017 - Sep 2018

Undergraduate Research Assistant

Advisor: Satinder Singh

- Implemented various deep RL algorithms such as A2C (with and without RNN) and hierarchical RL algorithms such as Option-Critic (with Deliberation Cost) in TensorFlow and evaluated the algorithms on SC2LE.
- Attended Blizzard × DeepMind StarCraft II Workshop @ Anaheim, CA with other undergraduate colleagues and interacted with world-leading researchers working on SC2LE.

- Implemented deep learning baseline algorithms (i.e. Im2txt and Seq2seq) for the *personalized* image captioning task and evaluated them on the large scale multi-media dataset Yahoo Flickr Creative Commons 100 Million (YFCC100M).
- Presented on the overview of *non-task oriented* (or *conversational*) dialogue system evaluation methods and potential future directions during the lab discussion.

AWARDS AND HONORS

Dean's Honor List

2013, 2016

George Washington University SEAS Engineering Awards

2013

SOFTWARE PROJECTS

Fire Detection

Implemented an YOLO-v2 detection algorithm that can detect the instance of fire in the video by importing the pre-trained weights and training it on the new fire image datasets collected by our team.

Facial-Image Sentiment Classification

Analyzed the facial image dataset through K-means algorithm and implemented autoencoder and convolutional neural networks (CNN) for classification.

Recycle.it

Developed a eco-friendly, camera-based progressive web application using React.js. The application scans a barcode of a product and informs the user with helpful recycling information.

TSP with Approximation and Optimization Algorithm

Implemented MST approximation and Branch-and-Bound optimization algorithms to several Traveling Salesman Problems (TSP) to create an optimal circuit path to all the nodes.

RELEVANT COURSES

Computer Science

EECS498: Reinforcement Learning

EECS442: Intro to Computer Vision

EECS445: Intro to Machine Learning

EECS492: Intro to Artificial Intelligence

Mathematics

MATH217: Linear Algebra

MATH451: Advanced Calculus

MATH425: Intro to Probability

MATH412: Intro to Modern Algebra

TECHNICAL SKILLS

Machine Learning Libraries

Tensorflow, PyTorch, Keras

Programming Languages

Python, C/C++, C#, Javascript

Operating Systems

Linux, Unix