

# HYUNJAE WOO

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<https://jaejaywoo.github.io>

## RESEARCH INTERESTS

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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

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**University of Michigan - Ann Arbor**

*Sep 2013 - Present*

*B.S.E. in Computer Science & Engineering*

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

## PUBLICATIONS

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**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

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**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

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Dean's Honor List

2013, 2016

George Washington University SEAS Engineering Awards

2013

## SOFTWARE PROJECTS

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### 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

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### 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

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### Machine Learning Libraries

Tensorflow, PyTorch, Keras

### Programming Languages

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

### Operating Systems

Linux, Unix