SIHUI DAI

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EDUCATION

California Institute of Technology *September 2016 - June 2020*
Bachelor of Science, Major in Computer Science, Minor in Information and Data Sciences, GPA: 3.8

WORK EXPERIENCE

RealNetworks, NY July 2017 - September 2017
Quality Assurance Intern

· Worked closely with quality assurance team in designing and performing regression tests on new software builds for spam text message recognition. Suggested improvements to increase the robustness of software. Developed program for test automation.

RESEARCH EXPERIENCE

California Institute of Technology, CA January 2019 - Present
Undergraduate Researcher, Dr. Anima Anandkumar's group

· Improved out-of-distribution (OoD) detection by adding a generative feedback network to CNNs. Proposed using $p(z|y)$ as a metric for uncertainty where z are latent variables used in the generative feedback network. Collaborated with Dr. Richard Baraniuk's signal processing group at Rice University. Project accepted for poster presentation at WiML workshop 2019.

· Propose *Convolutional Neural Networks with Feedback (CNNF)* for robust vision. CNNF uses an approximation for loopy belief propagation in order to achieve a set of input x, predicted logits y, and latent variable z which maximize their joint likelihood $p(x, y, z)$. Worked in collaboration with Dr. Doris Tsao's neuroscience group at Caltech, Dr. Richard Baraniuk's signal processing group at Rice, and researchers at Nvidia. Gave oral and poster presentation on research as part of Caltech's Summer Undergraduate Research Fellowships program. Poster presentation won first place in Caltech's Vodopia-Hasson Poster Competition. Paper published in NeurIPS Real Neurons & Hidden Units workshop. Project was also accepted for oral presentation at DeepMath conference 2019.

California Institute of Technology, CA March 2019 - Present
Undergraduate Researcher, Dr. Yisong Yue's group

· Optimized model-based planning in reinforcement learning by *amortized planning*. Amortized planning improves the efficiency of gradient-based planning by introducing a neural network to learn a nonlinear function for gradient descent. Evaluated the performance of amortized planning on multiple reinforcement learning environments and model-based planning domains.

Gwangju Institute of Technology, CA June 2018 - September 2018
Undergraduate Exchange Researcher, Dr. Kin Choong Yow's group

· Reduced the number of measurements needed for free-viewpoint television by using generative adversarial networks (GANs) for interpolation between different viewpoints. Searched the latent space of GAN for latent vectors corresponding to images of different viewpoints and generate images using linear interpolation along the latent vector.

TEACHING EXPERIENCE

California Institute of Technology, CA
Teaching Assistant, Computing and Mathematical Sciences Department

Aided instructors in grading assignments and holding office hours

- CS1: Introduction to Computer Programming
- CS11: Computer Language Lab (C++ track)
- CS156: Learning Systems
- CS165: Foundations in Machine Learning and Statistical Inference

PUBLICATIONS

Y. Huang, **S. Dai (co-first author)**, T. Nguyen, R. G. Baraniuk, A. Anandkumar. *Brain-inspired Robust Vision using Convolutional Neural Networks with Feedback.* Submitted, 2019

Y. Huang, **S. Dai (co-first author)**, T. Nguyen, R. G. Baraniuk, A. Anandkumar. *Out-of-Distribution Detection Using Neural Rendering Generative Models.* Submitted, 2019