Yilun (Evelyn) Hao

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EDUCATION

Stanford University, Stanford, CA   Sep 2021 - Jun 2023(Expected)
Master of Science (GPA: 4.0/4.0） Major in Computer Science
Core courses: Machine Learning, Decision Making Uncertainty, Safe and Interactive Robotics

University of California, San Diego, La Jolla, CA   Aug 2017 - Jun 2021
Bachelor of Science (GPA: 3.9/4.0） Major in Computer Science   Minor in Mathematics
Honors: Provost Honors, Magna Cum Laude

PUBLICATIONS (* denotes equal contribution)

Master:

- **Yilun Hao***, Ruinan Wang*, Zhangjie Cao, Zihan Wang, Yuchen Cui, Dorsa Sadigh, "Masked Imitation Learning: Discovering Environment-Invariant Modalities in Multimodal Demonstrations", Under Review for *IEEE Conference on Robotics and Automation (ICRA), 2023* Paper
- Ruohan Zhang*, Dhruva Bansal*, **Yilun Hao***, Ayano Hiranaka, Jialu Gao, Chen Wang, Roberto Martín-Martín, Li Fei-Fei, Jiajun Wu, "A Dual Representation Framework for Robot Learning with Human Guidance", *Proceedings of the 6th Conference on Robot Learning (CoRL), 2022* Paper
- Zihan Wang*, Zhangjie Cao*, **Yilun Hao**, Dorsa Sadigh, "Weakly Supervised Correspondence Learning", *IEEE Conference on Robotics and Automation (ICRA), 2022* Paper
- Zhangjie Cao, **Yilun Hao**, Mengxi Li, Dorsa Sadigh "Learning Feasibility to Imitate Demonstrators with Different Dynamics", *Proceedings of the 5th Conference on Robot Learning (CoRL), 2021* Paper

Undergraduate:

- Justin Morris, **Yilun Hao**, Saransh Gupta, Behnam Khaleghi, Baris Aksanli, Tajana Rosing "Stochastic-HD: Leveraging Stochastic Computing on the Hyper-Dimensional Computing Pipeline", *Frontiers in Neuroscience, 2022* Paper
- **Yilun Hao**, Saransh Gupta, Justin Morris, Behnam Khaleghi, Baris Aksanli, and Tajana Rosing "Stochastic-HD: Leveraging Stochastic Computing on Hyper-Dimensional Computing", *IEEE International Conference on Computer Design (ICCD), 2021* Paper
- Justin Morris, **Yilun Hao**, Saransh Gupta, Ranganathan Ramkumar, Jeffrey Yu, Mohsen Imani, Baris Aksanli, Tajana Rosing, "Multi-label HD Classification in 3D Flash", *IEEE/IFIP International Conference on VLSI and System-on-Chip (VLSI-SoC), 2020*. (Invited Paper) Paper
- Justin Morris, Roshan Fernando, **Yilun Hao**, Mohsen Imani, Baris Aksanli, Tajana Rosing, "Locality-based Encoder and Model Quantization for Efficient Hyper-Dimensional Computing", *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems, 2020* Paper

RESEARCH EXPERIENCE

Stanford Vision and Learning Lab (SVL)   Mar 2022 – Current
Research Assistant supervised by Prof. Fei-Fei Li and Prof. Jiajun Wu   Stanford University

Learning from Suboptimal Demonstrations with Human Evaluative Feedback
- Working on leveraging sparse human evaluative feedbacks to better learn from suboptimal demonstrations

A Dual Representation Framework for Robot Learning with Human Guidance
- Noticed that human guidance is an expensive resource for robot learning and learning can be more efficient if equipped with a high-level, symbolic representation
- Proposed a dual representation framework includes one for learning policies with low-level state representation, and one for high-level human internal state representation using symbolic scene graph
- Designed and implemented Dual Representation–based Preference Learning (DRPL) which builds upon scene graph-based trajectory segmentation and selection and allows efficient reward learning from chosen trajectory segments
- Conducted experiments in three simulation tasks and two real-robot tasks with Sawyer robot and showed that our algorithms lead to significant improvements in learning speed and performance

Stanford Intelligent and Interactive Autonomous Systems Group (ILIAD)   Apr 2021 - Current
Research Assistant supervised by Prof. Dorsa Sadigh   Stanford University
Masked Imitation Learning: Discovering Environment-Invariant Modalities in Multimodal Demonstrations
- Noticed that the extraneous data modalities in multimodal demonstrations can lead to state over-specification, which make the learned policy not generalizable outside of the training data distribution
- Proposed Masked Imitation Learning (MIL) to address state over-specification by bi-level optimization to learn a binary mask to block certain modalities and only selectively use informative modalities
- Conducted experiments using Robomimic dataset, MuJoCo environments, and a real Franka Panda arm and demonstrated that MIL outperforms baseline algorithms

Weakly Supervised Correspondence Learning
- Proposed a weakly supervised correspondence learning approach that trades off between strong supervision over strictly paired data and unsupervised learning with a regularizer over unpaired data
- Built Cross-morphology experiments with simulated Panda Robot with PyBullet, which showed that proposed algorithm achieves much higher performance compared to prior methods

Learning Feasibility to Imitate Demonstrators with Different Dynamics
- Noticed that in real world applications it is necessary to be able to learn from demonstrations of different dynamics, and there may be some demonstrations that is not feasible in given dynamics
- Provided a novel algorithm, feasibility MDP, that calculates the feasibility score of different demonstrations that encourages the imitator to learn from more informative and more feasible demonstrations and disregard the far from feasible demonstrations
- Conducted experiments in MuJoCo simulation tasks, simulated robot arm with Pybullet, and real robot arm with Franka Panda arm and showed that the proposed approach outperforms the baseline methods both in expected return and success rate

System Energy Efficiency Lab (SEE Lab)   Apr 2019 - Jun 2021
Research Assistant supervised by Prof. Tajana Rosing   University of California, San Diego
- Designed and implemented machine learning algorithms with Hyperdimensional (HD) Computing to raise both the accuracy and efficiency of single-label& multi-label& image classification problem

WORKING EXPERIENCE

Stanford University | Course Assistant in Computer Science Dept.   Jan 2022 - Apr 2021
- Worked as course assistant of CS237B: Principles of Robot Autonomy II
- Held office hours weekly to help ten to fifteen students closely and answered questions in Ed
- Designed and evaluated homework and exams through the quarter

University of California, San Diego | Tutor in Computer Science Dept.   Jan 2021 - Jun 2021
- Tutored "Components & Design Techniques for Digital Systems" and "Introduction to Machine Learning"

Golf AI | Software Engineer   Jul 2020 – Sep 2020
- Designed and implemented an upgraded User Interface of the GolfAI application using SwiftUI
- Implemented the "Overview" page that gives feedback based on users' swings and recommends practice

University of California, San Diego | Grader in Mathematics Dept.   Sep 2018 - Jun 2019
- Worked as grader of "Calculus&Analytic Geometry for Sci&Engnr" and "Intro to Differential Equations"

ACADEMIC SERVICES

Reviewer: Conference on Robot Learning (CoRL), 2022
IEEE Transactions on Robotics (T-RO)

SKILLS

Programming: Python, PyTorch, TensorFlow, C/C++, Java, Shell, MATLAB, Unix/Linux and vi/vim, Git, LaTeX
Robotics: MuJoCo, Pybullet, Franka Panda, Sawyer, ROS
Algorithms: Machine Learning, Imitation Learning, Reinforcement Learning, Computer Vision
Language: Chinese (native), English (GRE: 332+4.0 (V:162, Q:170, AW:4.0)), Japanese, French