

Yiwen (Evie) Qiu

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Education

Department of Philosophy, Carnegie Mellon University	Aug 2023 -
Department of Automation, Tsinghua University, Beijing, China	Aug 2019 - Jul 2023
➤ Major GPA: 3.86/4.0 Ranking: Top 15% in 160+ students (Top 3 in Female Students)	
➤ Core Courses:	
<i>Causality and Machine Learning, Convex Optimization, Operations Research, Pattern Recognition and Machine Learning, Big Data and Machine Intelligence, Foundation of Artificial Intelligence, Automatic Control Theory, Computer Principles and Applications, Signals and System Analysis, C++ and its applications</i>	
➤ Honors and Awards:	
Scholarship for overall excellence (15/160, highest scholarship for comprehensive performance)	Oct.2021 &22
Person of the Year in Department of Automation (10 in 500+)	Dec.2021
Excellent Youth League member, Tsinghua University (15/105, awarded for <i>leadership</i> in teamwork)	Oct.2020
Weichai Scholarship, for academic excellence and excellent social work	Oct.2020

Research Interests

- Causality, and specifically Causal RL & Causal IL
- Mathematical Control Theory

Publications

- Zheng, Yujia, Zeyu Tang, Yiwen Qiu, Bernhard Schölkopf, and Kun Zhang. "Detecting and Identifying Selection Structure in Sequential Data.", *accepted by International Conference on Machine Learning (ICML)*, 2024. [arxiv](#)
- Y. Wang, **Y. Qiu**, M. Sader, D. Huang and C. Shang, "Data-Driven Predictive Control Using Closed-Loop Data: An Instrumental Variable Approach," in *IEEE Control Systems Letters*, 2023. [link](#)
- **Yiwen Qiu**, Jialong Wu, Zhangjie Cao, Mingsheng Long, "Out-of-Dynamics Imitation Learning from Multimodal Demonstrations", *accepted by Conference on Robot Learning (CoRL)*, 2022 [OpenReview](#) [arxiv](#)
- Haoyi Niu, Shubham Sharma, **Yiwen Qiu**, Ming Li, Guyue Zhou, Jianming Hu, Xianyuan Zhan, "When to Trust Your Simulator: Dynamics-Aware Hybrid Offline-and-Online Reinforcement Learning", *accepted by Neural Information Processing Systems (NeurIPS)*, 2022, *Spotlight* [arxiv](#)

Project Experiences

Modularized Out-of-Dynamics(OOD) Imitation Learning | RA July 2022 - Present

Advisor: **Kun Zhang**, Associate Professor, Carnegie Mellon University & MBZUAI

- Considered a more general case where trajectories were **composed of multiple sub-tasks** based on previous OOD-IL works. Attempted to generalize policies to novel scenarios with **arbitrary recombination** of sub-tasks.
- Designed an algorithm to reveal the **hidden structures of sub-tasks** from their resulting state-action trajectory sequences under multiple dynamics from a causal view by leveraging mutual information theory.
- Developing a **hierarchical policy** to generate trajectories in accordance with the target new environment by appropriately disambiguating between different sub-tasks.

Out-of-Dynamics (OOD) Imitation Learning from Multimodal Demonstrations | RA March 2022 - July 2022

Advisor: **Mingsheng Long**, Associate Professor, Machine Learning Group, School of Software, Tsinghua University

- Studied **out-of-dynamics** imitation learning (OOD-IL): the assumption in Imitation Learning (IL) is that the demonstrator **shares the same dynamics** as the imitator, which **limits the usage of IL**. The research was aimed at enabling a wider usage of a mixture of multimodal demonstrations in IL.
- Developed a novel **sequence-based contrastive clustering** algorithm to tackle the **multimodal distribution** problem in demonstrations collected under multiple sources and mitigated their negative mutual influence.
- Developed an adversarial-based transferability measurement to down-weight non-transferable demonstrations for OOD-IL, which enables agents to learn from a mixture of source data under **different dynamics**.
- Conducted experiments on **3 MuJoCo** environments, a **driving**, and a **simulated robot** environment — demonstrating that the proposed approach outperforms prior works on final IL performance by 100 ~ 300%.

Dynamics-Aware Hybrid Offline-and-Online Reinforcement Learning | RA. Feb 2022 - April 2022

Advisor: **Xianyuan Zhan**, Institute for AI Industry Research (AIR), Tsinghua University, China

- Combined learning from **limited** real data in offline RL with **unrestricted exploration** of imperfect simulators in online RL, which was a novel scenario.
- Proposed the Dynamics-Aware **Hybrid Offline-and-Online Reinforcement Learning (H2O)** framework and theoretically proved it can allow learning with high-fidelity from both offline-dataset and online-exploration.
- Designed a practical implementation with PyTorch through **an adversarial training** process, adaptively penalizing the learning on simulated state-action pairs with large dynamics gaps.
- Conducted experiments in **4** datasets of MuJoCo, **each with 3 unreal artificial dynamics** (Gravity / Friction / Joint-Noise) and a **real wheel-legged robot**, and achieved results that outperformed all existing baselines.

Universal Domain Adaptation with Meta-learning | RA Aug 2021-Dec 2022

Advisor: **Mingsheng Long**, Associate Professor, Machine Learning Group, School of Software, Tsinghua University

- Attempted to eliminate the **label category gap** on sources and target domains in Domain Adaptation (DA) tasks, called Universal DA by identifying outlier samples without the need for prior knowledge.
- Conducted experiments with PyTorch and achieved improving performance on Office31, OfficeHome settings. (1~2% in accuracy, 8% in h-score) by utilizing **a meta-learning method**.

Modular Networks for Domain Generalization | RA. Nov 2021-Jan 2022

Advisor: **Mingsheng Long**, Associate Professor, Machine Learning Group, School of Software, Tsinghua University

- Designed a novel mixture-of-experts **modular structure with an attention mechanism** for models to merge domain-generic and domain-specific information to **selectively produce knowledge** in a more flexible way.
- Conducted experiments on **OfficeHome** and **WILDS** datasets for image classification task **in unseen domain (DG tasks)**, demonstrating that the modularized design significantly boosts the performance by 1%.

Leadership and Activities

Student Union, Department of Automation | Vice Minister Aug 2020-Aug 2021

- Served as a chief stage director in Student Festival of Department of Automation, 2021. Lead a team of 40+ members, arranged 10+ programs, directed stage performances for an evening in the Great Hall (900 audience).
- Served as a hostess in Student Festival, 2022.

Association of Warmth & Love, Tsinghua University | Operation Center Oct 2019-Oct 2020

- Organized a novel voluntary program for letter communication. Awarded as Five-Star Volunteer Project.

Students Union, Department of Automation | P.E. Apartment, member Oct 2019-Oct 2021

- Joined badminton team, competed in John Ma Cup competitions of female doubles and mixed-doubles.
- Joined karate team, competed in John Ma Cup competition and got top-8 awards in individual and team events.

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