# JIAYU CHEN

jiayuc2@andrew.cmu.edu · (+1)7654098322 · LucasCJYSDL · Jiayu Chen

## Professional Experience

**Carnegie Mellon University**, Pittsburgh, Pennsylvania, U.S.A May 2024 – May 2025

*Postdoctoral Fellow* in School of Computer Science

## Education Background

**Purdue University**, West Lafayette, Indiana, U.S.A 2020 – 2024

*Ph.D.* in Industrial Engineering and Operations Research

**Peking University**, Beijing, China 2016 – 2020

*B.E.* from College of Engineering, Minor in Computer Science

## Research Areas

Reinforcement Learning, Monte Carlo Tree Search, Optimal Control, Representation Learning

## Conference Publications

1. Wentse Chen, **Jiayu Chen**, Fahim Tajwar, Hao Zhu, Xintong Duan, Russ Salakhutdinov, and Jeff Schneider, "Fine-tuning LLM Agents with Retrospective In-Context Online Learning", accepted in NeurIPS Adaptive Foundation Models Workshop, Oct 2024 (**Oral presentation**, full version in progress).
2. **Jiayu Chen**, Wentse Chen, and Jeff Schneider, "Bayes Adaptive Monte Carlo Tree Search for Offline Model-based Reinforcement Learning", submitted to International Conference on Learning Representations (ICLR), 2025.
3. **Jiayu Chen**, Bhargav Ganguly, Tian Lan, and Vaneet Aggarwal, "Variational Offline Multi-agent Skill Discovery", submitted to Annual AAAI Conference on Artificial Intelligence, 2025.
4. Wenyan Xu, **Jiayu Chen**, Chen Li, Yonghong Hu, and Zhonghua Lu, "Mining Intraday Risk Factor Collections via Hierarchical Reinforcement Learning based on Transferred Options", submitted to SIAM International Conference on Data Mining (SDM), 2025.
5. **Jiayu Chen**, Vaneet Aggarwal, and Tian Lan, "A Unified Algorithm Framework for Unsupervised Discovery of Skills based on Determinantal Point Process", accepted in Conference on Neural Information Processing Systems (NeurIPS), Dec 2023.
6. **Jiayu Chen**, Dipesh Tamboli, Tian Lan, and Vaneet Aggarwal, "Multi-task Hierarchical Adversarial Inverse Reinforcement Learning", accepted in International Conference on Machine Learning (ICML), Jul 2023.
7. **Jiayu Chen**, Tian Lan, and Vaneet Aggarwal, "Option-Aware Adversarial Inverse Reinforcement Learning for Robotic Control", accepted in IEEE International Conference on Robotics and Automation (ICRA), Jun 2023.
8. **Jiayu Chen**, Jingdi Chen, Tian Lan, and Vaneet Aggarwal, "Scalable Multi-agent Covering Option Discovery based on Kronecker Graphs", accepted in Conference on Neural Information Processing Systems (NeurIPS), Dec 2022.
9. **Jiayu Chen**, Marina Wagdy Wadea Haliem, Tian Lan, and Vaneet Aggarwal, "Multi-agent Deep Covering Option Discovery", accepted in ICML Reinforcement Learning for Real Life Workshop, Jul 2021.
10. **Jiayu Chen**, Abhishek K. Umrawal, Tian Lan, and Vaneet Aggarwal, "DeepFreight: A Model-free Deep-reinforcement-learning-based Algorithm for Multi-transfer Freight Delivery", accepted in International Conference on Automated Planning and Scheduling (ICAPS), Aug 2021.

11. Pin Wang, Dapeng Liu, **Jiayu Chen**, Hanhan Li, and Ching-Yao Chan, "Decision Making for Autonomous Driving via Augmented Adversarial Inverse Reinforcement Learning", accepted in IEEE International Conference on Robotics and Automation (ICRA), Jun 2021.

12. Jilin Mei, **Jiayu Chen**, Wen Yao, Xijun Zhao, and Huijing Zhao, "Supervised Learning for Semantic Segmentation of 3D LiDAR Data", accepted in IEEE Intelligent Vehicles Symposium (IV), Jun 2019.

## Journal Publications

1. Swetha Ganesh, **Jiayu Chen**, Gugan Thoppe, and Vaneet Aggarwal, "Global Convergence Guarantees for Federated Policy Gradient Methods with Adversaries", submitted to Transactions on Machine Learning Research (TMLR).

2. Bhargav Ganguly, Abhimanyu Shekhar, Chang-Lin Chen, **Jiayu Chen**, Vaneet Aggarwal, Shweta Singh, "A Deep Reinforcement Learning Approach for Circular Economy Management", submitted to Nature Sustainability.

3. **Jiayu Chen**, Tian Lan, and Vaneet Aggarwal, "Hierarchical Deep Counterfactual Regret Minimization", submitted to Journal of Machine Learning Research (JMLR).

4. Chang-Lin Chen, Hanhan Zhou, **Jiayu Chen**, Mohammad Pedramfar, Vaneet Aggarwal, Tian Lan, Zheqing Zhu, Chi Zhou, Pol Mauri Ruiz, Neeraj Kumar, and Hongbo Dong, "Learning-based Two-tiered Online Optimization of Region-wide Datacenter Resource Allocation", accepted in IEEE Transactions on Network and Service Management (TNSM), Oct, 2024.

5. **Jiayu Chen**, Bhargav Ganguly, Yang Xu, Yongsheng Mei, Tian Lan, and Vaneet Aggarwal, "Deep Generative Models for Offline Policy Learning: Tutorial, Survey, and Perspectives on Future Directions", accepted in Transactions on Machine Learning Research (with a **Survey Certification**), Aug 2024..

6. Dipesh Tamboli, **Jiayu Chen**, Kiran Pranesh Jotheeswaran, Denny Yu, and Vaneet Aggarwal, "Reinforced Sequential Decision-Making for Sepsis Treatment: The PosNegDM Framework with Mortality Classifier and Transformer", accepted in IEEE Journal of Biomedical and Health Informatics (JBHI), Mar 2024.

7. **Jiayu Chen**, Vaneet Aggarwal, and Tian Lan, "Hierarchical Adversarial Inverse Reinforcement Learning", accepted in IEEE Transactions on Neural Networks and Learning Systems (TNNLS), Aug 2023.

8. **Jiayu Chen**, Jingdi Chen, Tian Lan, and Vaneet Aggarwal, "Learning Multi-agent Options for Tabular Reinforcement Learning using Factor Graphs", accepted to IEEE Transactions on Artificial Intelligence (TAI), Jul 2022.

## Teaching Experience

**School of IE, Purdue University**, West Lafayette, Indiana, U.S.A 2021 Fall – 2024 Spring

*Teaching Assistant* IE 23000 - Probability And Statistics, IE 53800 - Nonlinear Optimization

## Research Experience

**School of CS, Carnegie Mellon University**, Pittsburgh, Pennsylvania, U.S.A 05/2024 – 05/2025

*Postdoctoral Fellow* **Instructor: Prof. Jeff Schneider**

My research primarily explores the application of reinforcement learning and deep search in plasma control. This collaborative endeavor involves Princeton University, Princeton Plasma Physics Laboratory, and General Atomics, and focuses on advancing controllable nuclear fusion. The project is supported by a grant from the United States Department of Energy. The specific research topics are as follows:

- Modeling the dynamics of plasma within the Tokamak device, specifically DIII-D, by supervised learning;
- Quantifying the uncertainty of dynamic predictions using deep ensemble methods.
- Developing control policies based on Bayes-adaptive RL and Monte Carlo Tree Search.
- Enhancing the generalization and robustness of offline model-based RL via causal discovery.

**School of IE, Purdue University**, West Lafayette, Indiana, U.S.A 07/2020 – 05/2024

*Research Assistant* **Instructor: Prof. Vaneet Aggarwal, Prof. Tian Lan**

- Reinforcement Learning Algorithm Design:
  - Unsupervised/Multi-agent/Offline Skill Discovery
  - Hierarchical Decision Making
  - Multi-task Hierarchical Imitation Learning
- Reinforcement Learning Applications:
  - Developed a scalable and robust scheduling algorithm that integrates Multi-agent Reinforcement Learning and Optimization for multi-transfer freight delivery.
  - Developed a large-scale Poker AI based on Multi-agent Reinforcement Learning and Heuristic Search.
  - Utilized Offline Reinforcement Learning (specifically Decision Transformer) to optimize healthcare decision-making for sepsis treatment, approaching the level of expert performance.

**School of EECS, University of California, Berkeley**, California, U.S.A 09/2019 – 01/2020

*Research Assistant* **Instructor: Prof. Ching-Yao Chan**

- Developed a lane-changing simulator based on SUMO for efficient RL training and evaluation.
- Proposed a novel Meta Imitation Learning algorithm for diverse lane-changing behavior learning of autonomous vehicles.

**School of EECS, Peking University**, Beijing, China 09/2018 – 07/2020

*Research Assistant* **Instructor: Prof. Huijing Zhao**

- Explored the optimal composition of data input from various sensor types for semantic segmentation of 3D LiDAR data, crucial for semantic understanding in autonomous driving.
- Worked on semi-supervised learning for semantic segmentation of 3D LiDAR data in dynamic scenes, achieving performance on par with fully supervised algorithms while utilizing just 50% labeled data.
- Constructed a simulator using CARLA to model interactions between autonomous vehicles and pedestrians, emulating crucial decision-making scenarios in autonomous driving, and employed (Inverse) RL techniques for driving behavior learning.

## Honors and Awards

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| Benz Scholarship, Peking University | Dec 2017 |
| Learning Excellence Award, Peking University | Dec 2017 |
| JJ World Scholarship, Peking University | Dec 2018 |
| Merit Student Award, Peking University | Dec 2018 |
| Peking University Third Prize Scholarship, Peking University | Dec 2019 |
| Merit Student Award, Peking University | Dec 2019 |
| NeurIPS Scholar Award, NeurIPS | Oct 2022, Oct 2023 |
| Oracle for Research Project Award, Oracle | Aug 2023 |
| Graduate School Summer Research Grant, Purdue University | Mar 2024 |

## Invited Talks

- **Temporal Abstractions in Multi-agent Learning.** Department of Systems Engineering, City University of Hong Kong, Online, October 9th, 2024.
- **Learning and Search in Sequential Decision Making.** Department of Data Science, City University of Hong Kong, Online, October 13rd, 2024.
- **Learning and Search in Sequential Decision Making.** Department of Data and Systems Engineering, The University of Hong Kong, Online, October 21st, 2024.

## Service

- Reviewer:

  - ICLR (2024, 2025), NeurIPS (2023, 2024), ICML (2022, 2024), L4DC 2024, AISTATS 2025, ICRA 2025
  - Scientific Reports, Information Sciences, Engineering Applications of Artificial Intelligence
  - IEEE Transactions on Neural Networks and Learning Systems
  - IEEE Transactions on Artificial Intelligence
  - IEEE Transactions on Games
  - IEEE Transactions on Intelligent Transportation Systems
  - IEEE Transactions on Cybernetics
  - IEEE Transactions on Cognitive and Developmental Systems
  - Transactions on Machine Learning Research
- Program Committee:
  - IEEE International Conference on Data Science and Advance Analytics, 2023
  - AAAI 2025, SIAM SDM 2025