

MINGXUAN LI

Causal Artificial Intelligence Lab, Columbia University, New York, NY 10027

ml@cs.columbia.edu \diamond <https://mingxuan.me>

EDUCATION

Columbia University

Sept 2021 - Now

PhD in Computer Science (Causal Inference & Reinforcement learning)

Advisor: Elias Bareinboim.

Brown University

Sept 2019 - June 2021

ScM in Computer Science, GPA: 4.0/4.0

Advisor: Michael L. Littman.

Beihang University

Sept 2015 - June 2019

BS in Computer Science and Technology; Overall GPA: 3.7/4.0

RESEARCH INTERESTS

Causal Inference, Reinforcement Learning

PRE-DOCTORAL PUBLICATIONS

- “Learning Generalizable Behavior via Visual Rewrite Rules” - *AAAI-22 Workshop on Reinforcement Learning in Games* Yiheng Xie*, **Mingxuan Li***, Shangqun Yu*, Michael L. Littman
- “Towards Sample Efficient Agents through Algorithmic Alignment” - *AAAI-21 Student Abstract and Poster Program* **Mingxuan Li**, Michael L. Littman
- “Interpretability is a Kind of Safety: An Interpreter-based Ensemble for Adversary Defense” - *KDD-20* Jinyuan Wang, Yufan Wu, **Mingxuan Li**, Xin Lin, Junjie Wu, Chao Li

SELECTED RESEARCH EXPERIENCE

Causal Curriculum Learning

Feb. 2022 - Now

Advisor: Prof. Elias Bareinboim

Causal AI Lab, Columbia University

- Identified a confounded problem setting where state-of-the-art curriculum learning methods collapse;
- Analysed and proved the graphical conditions for optimal policy transfer to hold;
- Proposed a principled way of designing causally correct curriculum in confounded environments.

Learning to Control with the Explainable Latent Dynamics Graph

Jan. 2021 - Sept. 2021

Advisor: Prof. Michael L. Littman

RLab, Brown University

- Led the effort to build a generalizable StarCraft agent for the DARPA XAI project;
- Designed the Latent Relational World Model, an explainable world model based on GNNs that learns object-oriented latent dynamics from purely pixel inputs;
- Proposed a soft lambda return actor-critic algorithm learning behaviors from simulated trajectories;

Towards Sample Efficient Agents through Algorithmic Alignment

Mar. 2020 - May 2020

Advisor: Prof. Michael L. Littman

RLab, Brown University

- Revealed the potential of GNNs in sample efficient learning by creating the Deep Graph Value Networks (DeepGVs);
- DeepGVs efficiently solved MDPs and outperformed unstructured baseline by over 50%;
- Resulted in a short paper accepted by AAAI-21 Student Abstract and Poster Program.

Robust Adversaries Detection and Recovery

Advisor: Prof. Jingyuan Wang, Dr. Shuchang Zhou

Mar. 2019 - Nov. 2019

Megvii CV Group, Beihang U

- Was a key player in designing an input sensitivity-based adversarial examples detection and recovery pipeline which achieved an average of 96% detection accuracy and high robust classification accuracy against famous adversaries;
- Developed a theoretical explanation of L_2 adversarial examples' intrinsic properties that can differentiate them from normal inputs;
- Formed a research paper as the first author, and a revised version was accepted by KDD 2020.

INTERNSHIP EXPERIENCE

Amazon

Advisor: Dr. Prag Mishra

Jun. 2021 - Aug. 2021

Applied Scientist Intern, Amazon Seattle

- Analysed billions of delivery trajectories to identify the bottleneck in delivery route planning;
- Proposed an online reinforcement learning agent that tunes the delivery route planning algorithm's hyper-parameters automatically based on recent performance;
- Improved delivery efficiency by 15% compared to the previous algorithm.

Turing Microbe Co.,Ltd

Advisor: Prof. Wei Xu (IIIS, Tsinghua U)

Mar. 2019 - Jul. 2019

Computer Vision Research Intern, R&D Department

- Analysed over 30,000 cases of gynecological diseases data with T-SNE and deep clustering to give doctors insights on new taxonomy for Bacterial Vaginal(BV) diagnosis;
- Used StyleGAN to generate realistic and highly diverse BV pictures for training young doctors;
- Highly recognized by Prof. Qinqing Liao, the chairman of the Chinese Medical Doctor Association, the gynecology branch, for insightful data analysis and practical application value of the work.

SELECTED PROJECTS

PiDrone: An autonomous drone using Raspberry Pi

Course Project

Sept. 2019 - Dec. 2019

Brown University

- Built a drone equipped with Raspberry Pi from scratch under the guidance of online manuals;
- Implemented core algorithms to enable the drone to fly, including PID controller, speed control with optical flow, state estimation with unscented Kalman Filter and position control with SLAM;
- Got a solid grasp of the foundations of robotics and probabilistic control theory.

JPEG-2000 Standard Image I/O Pipeline

Personal Side Project

May 2019 - Jun. 2019

Beihang U

- Implemented 2D-FastDCT and 2D-FFT in JAVA;
- Analysed JPEG-2000 ISO standard and implemented the whole I/O process, including image header information extraction, without using any external JAVA image processing packages;
- Provided a visual interface for previewing the processed image along with its greyscale distribution.

AWARDS&HONOURS

10/2018, Scholarship for Academic Achievements, Second Prize (Top 10%)

09/2018, Was selected to appear on the Deans List for the School of Engineering, HKUST

09/2017, The 1st National Student Computer System Capability Challenge, Second Prize (Final 2/70)

05/2017, The 27th "FengRu Cup" University Students Extra-Curricular Scientific and Technological Invention Competition, Second Prize (Final 4/176)