Kai Yan

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Research Interest

My research interest is deep learning for better decision making. I have worked on the following fields: 1) reinforcement learning with demonstrations / imitation learning, 2) multi-agent reinforcement learning, 3) prediction-and-optimization algorithms, 4) decision transformer, 5) LLM agent / post-training, 6) LLM many-shot in-context learning, 7) VLM spatial reasoning.

Education

University of Illinois Urbana-Champaign *Urbana, Illinois, US*

Ph.D. in Computer Science *Sept 2021 - Current*

Peking University *Beijing, China*

B.S. in Computer Science *Sept 2017 - Jun 2021*

- Member of the Turing Class honor program; graduate with *Summa Cum Laude*
- Serve as the vice president of the student union for the school of EECS; organize multiple large events with hundreds of participants

Academic Experience

University of Illinois Urbana-Champaign *Urbana, Illinois, US*

Graduate Research Assistant (Co-advised by Prof. Alexander G. Schwing and Prof. Yuxiong Wang) *Sept 2021 - 15th May, 2027 (Estimated)*

- Work on demonstration-guided reinforcement learning, imitation learning and Large Language Model reasoning / decision-making
- Experience in normalizing flows, convex optimization, optimal transport, decision transformer and LLM with MCTS search

Robotics Institute @ Carnegie Mellon University *Remote*

Visiting Student for Summer Research (Advised by Prof. Changliu Liu) *Jun 2020 - Jan 2021*

- Build a pandemic simulator with reinforcement learning agents as individuals
- Design algorithm for million-level multi-agent training; use Cython for parallelization & acceleration

National Engineering Laboratory for Video Technology @ Peking University *Beijing, China*

Undergraduate Research Student (Advised by Prof. Zongqing Lu) *Jun 2019 - Feb 2020*

- Work on adversarial agent in multi-agent systems
- Extensively read papers in reinforcement learning, multi-agent systems and algorithmic game theory, and implement RL algorithms from scratch
- Write a survey on algorithmic game theory and reinforcement learning

AILab @ Peking University *Beijing, China*

Undergraduate Research Student (Advised by Prof. Wenxin Li) *Nov 2018 - Mar 2019*

- Study *Introduction to Reinforcement Learning* and papers on Reinforcement Learning
- Program the judge for the game *Tank2* on Botzone, an AI platform for education and the judge is extensively used for freshmen's course projects

Industry Experience

Apple *Sunnyvale, US*

Research Intern (Advised by Prof. Philipp Krähenbühl) *May 2025 - Aug 2025*

- Train a VLM spatial reasoning agent with code interpreter for reasoning with SFT and RL

ByteDance Seed *San Jose, US*

Student Researcher (Advised by Dr. Jiecao Chen) *Jun 2024 - May 2025*

- Build a many-shot in-context learning benchmark and supervised finetuning for LLM self-plan
- Publish two benchmarks on testing LLM's many-shot inductive reasoning ability and reasoning robustness under subtly changed conditions
- Using verl for end-to-end training of a tool-using LLM agent with code intepreter as the environment

Microsoft Research Asia *Beijing, China*

Research Intern (Co-advised by Dr. Jie Yan and Dr. Chuan Luo) *Sept 2020 - Jun 2021*

- Design an prediction-and-optimization surrogate framework for linear/quadratic optimization problems with $max(\cdot, 0)$ operator, where the parameterized objective needs to be predicted from data
- Awarded *Stars of Tomorrow* title

Teaching Experience

University of Illinois Urbana-Champaign *Urbana, Illinois, US*

Teaching Assistant (Computational Photography) *Jan 2024 - May 2024*

- Host Office hours every week, grade homework and set up midterm exam

Peking University *Beijing, China*

Teaching Assistant (Introduction to Computer Systems) *Sept 2020 - Jan 2021*

- Host a 2-hour seminar of 15 students each week, revising classes and introducing cutting-edge applications of the knowledge taught in class
- Teach how to write & organize lecture notes; grade homework every week

Publications & Preprints

Conference

- **Kai Yan**, Yufei Xu, Zhengyin Du, Xuesong Yao, Zheyu Wang, Xiaowen Guo, Jiecao Chen. Recitation over Reasoning: Can Your Language Models Really Solve Simple Reasoning Problems? In IJCNLP-AACL, 2025.
- **Kai Yan**, Zhan Ling, Kang Liu, Yifan Yang, Ting-Han Fan, Lingfeng Shen, Zhengyin Du, Jiecao Chen. MIR-Bench: Benchmarking LLM's Long-Context Intelligence via Many-Shot In-Context Inductive Reasoning. In NeurIPS Datasets & Benchmarks Track, 2025.
- Anjiang Wei, Tarun Suresh, Jiannan Cao, Naveen Kannan, Yuheng Wu, **Kai Yan**, Thiago S. F. X. Teixeira, Ke Wang, Alex Aiken. CodeARC: Benchmarking Reasoning Capabilities of LLM Agents for Inductive Program Synthesis from Input-Output Examples. In COLM, 2025.
- **Kai Yan**, Alexander G. Schwing and Yuxiong Wang. Reinforcement Learning Gradients as Vitamin for Online Finetuning Decision Transformers. In NeurIPS, 2024. (Spotlight; top 2% submission)
- Andy Zhou, **Kai Yan**, Michal Shlapentokh-Rothman, Haohan Wang, Yuxiong Wang. Language Agent Tree Search Unifies Reasoning Acting and Planning in Language Models, In ICML, 2024. (Github > 750 Stars; integrated in LangChain; invited talk @ Autogen Discord)
- **Kai Yan**, Alexander G. Schwing and Yuxiong Wang. Offline Imitation from Observation via Primal Wasserstein State Occupancy Matching. In ICML, 2024.
- **Kai Yan**, Alexander G. Schwing and Yuxiong Wang. A Simple Solution for Offline Imitation from Observations and Examples with Possibly Incomplete Trajectories. In NeurIPS, 2023.
- **Kai Yan**, Alexander G. Schwing and Yuxiong Wang. CEIP: Combining Explicit and Implicit Priors for Reinforcement Learning with Demonstrations. In NeurIPS, 2022.
- **Kai Yan**, Jie Yan, Chuan Luo, Liting Chen, Qingwei Lin and Dongmei Zhang. A Surrogate Objective Framework for Prediction+Optimization with Soft Constraints. In NeurIPS, 2021.

Preprints

- Siqi Yang, **Kai Yan**, Alexander G. Schwing and Yuxiong Wang. Latent Wasserstein Adversarial Imitation Learning. In submission to ICLR, 2026.
- Zhan Ling, Kang Liu, **Kai Yan**, Yifan Yang, Weijian Lin, Ting-Han Fan, Lingfeng Shen, Zhengyin Du, Jiecao Chen. LongReason: A Synthetic Long-Context Reasoning Benchmark via Context Expansion. arXiv:2501.15089, 2025.
- **Kai Yan**[1], Zhenggang Tang[1], Liting Sun, Wei Zhan, Changliu Liu. A Microscopic Pandemic Simulator for Pandemic Prediction Using Scalable Million-Agent Reinforcement Learning. arXiv:2108.06589, 2021.
- **Kai Yan**[1], Yunlong Lu[1]. Algorithms in Multi-Agent Systems: A Holistic Perspective from Reinforcement Learning and Game Theory. arXiv:2001.06487, 2020.

Honors & Awards

Jan. 2025	**Graduate College Conference Presentation Award,** University of Illinois at Urbana-Champaign	*Urbana, Illinois, US*
Feb. 2023	**Graduate College Conference Presentation Award,** University of Illinois at Urbana-Champaign	*Urbana, Illinois, US*
Jul. 2021	**Stars of Tomorrow,** Microsoft Research Asia	*Beijing, China*
Nov. 2020	**John Hopcroft Scholarship,** Center on Frontiers of Computing Studies (CFCS) @ PKU	*Beijing, China*
Dec. 2019	**National Scholarship & Merit Student,** Peking University	*Beijing, China*
Jan. 2019	**Meritorious Winner,** International Mathematical Contest in Modeling (MCM)	*Remote*
Sept. 2018	**Founder Scholarship & Merit Student,** Peking University	*Beijing, China*
Apr. 2018	**2nd Award,** PKU ACM Campus	*Beijing, China*
Jul. 2016	**Silver Medal,** National Olympiad in Informatics (NOI)	*Mianyang, China*
May. 2016	**Silver Award,** Asian-Pacific Informatics Olympiad (APIO)	*Beijing, China*

[1]Equal contribution.

Services

Reviewer

- AAAI Conference on Artificial Intelligence **(AAAI), 2025**
- Transactions on Machine Learning Research **(TMLR), 2024-2025** (2025 Expert reviewer certification)
- IEEE/CVF Conference on Computer Vision and Pattern Recognition **(CVPR), 2023-2026**
- Neural Information Processing Systems **(NeurIPS), 2023-2025** (2024 Top 10% reviewer)
- International Conference on Learning Representations **(ICLR), 2024-2026**
- International Conference on Machine Learning **(ICML), 2024-2025**
- European Conference on Computer Vision **(ECCV), 2024**
- International Conference on Computer Vision **(ICCV), 2025**
- IEEE/CVF Winter Conference on Applications of Computer Vision **(WACV), 2026**

Misc.

- Vice President of the PKU EECS Student Union, 2019-2020

Invited Talks

Oct. 2024 **Guest Lecturer on Agentic Foundation Models,** University of Michigan *Online*
Sep. 2024 **Talks on Language Agent Tree Search (LATS),** AutoGen Discord Channel *Online*

Skills

Programming & Software Python (Pytorch for deep learning, CVXPY / Gurobi / Google ORTools for optimization and Cython for high-performance), C/C++, Java, Matlab, HTML/CSS, JavaScript (Node.js), Qt, LaTeX, Microsoft Office, Wireshark
Language English (Professional with TOEFL 117/120), Chinese (Native)