Xinyi Ni

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Education

University of California, Davis Davis, CA, USA
Ph.D. Electrical and Computer Engineering, Advisor: Lifeng Lai *Sept. 2019 - Dec. 2024*

Zhejiang University Zhejiang, China
B.Eng. Information Engineering *Sept. 2015 - Jun. 2019*

Courses: Reinforcement Learning, Deep Learning, Large Language Models, Mathematics and Statistics, Optimization, Data Structures & Algorithms, Time Series, Causal Analysis.
Honors: Dean's Distinguish Scholarship, Academic Excellence Student Honors.

Skills

Programming: Python, C/C++, Java, Latex, SQL, R, MATLAB.
Tools: TensorFlow, Keras, Caffe, PyTorch, Azure, AWS, GCP.
Models: Transformer, GPT4o, CNN, RNN, LSTM, DQN, GNN, GAN.

Work Experience

Research Intern Jun. 2024 - Sept. 2024
Xbox Gaming AI @ Microsoft | LLM, RLHF, RL, Causal Analysis Redmond, WA

- Conducted causal analysis on game data to extract and identify key patterns in events and agent behaviors.
- Engineered an LLM reasoning model for state and transition detection, optimized through prompt engineering and human feedback; integrated RL to train agents for automatic mission completion, aligning actions with user goals.
- Constructed a human-annotated dataset and established performance metrics, achieving an 80% reduction in testing time and improving the accuracy of mission-critical state; integrated the solution into Xbox QACopilot.

Selected Research & Project Experience

Risk-Sensitive RL with Human Feedback | *Paper Submitted to ICLR 2025* Jan. 2024 - Jun. 2024

- Developed a novel framework for risk-sensitive RL that leverages human feedback.
- Proposed both black-box and white-box algorithms to solve CVaR RL using utility-based feedback mechanisms.
- Demonstrated algorithm convergence and analyzed sample complexity, showcasing its applicability in real-world scenarios, such as training LLMs with risk-sensitive RLHF techniques.

Autonomous Driving with Distributed RL | *Azure, Keras, DQN, RL* Sept. 2023 - Feb. 2024

- Built a platform using Azure with N-series GPUs and AirSim for virtual landscape simulation.
- Applied ROI detection, data cleaning, and data augmentation techniques to a 3.5GB dataset from Microsoft; designed a customized reward function and integrated decision maker's risk preferences as additional features.
- Fine-tuned a Deep Q-Network (DQN) to predict driving control signals (steering angle) based on vehicle state parameters and front-facing camera frames, achieving stable and controlled autonomous driving for up to 5 minutes, demonstrating practical deployment capabilities within defined budget constraints.

Risk-Sensitive Reward-Free RL with CVaR | *Paper Accepted to ICML 2024* Jun. 2023 - Jan. 2024

- Proposed a reward-free framework to enhance efficient exploration of the environment without predefined rewards.
- Developed algorithms that solve CVaR RL with any given reward function based on single exploration dataset.
- Demonstrated PAC guarantees and analyzed sample complexity, demonstrating applicability in real-world scenarios, such as autonomous driving in uncertain terrains and robotic exploration in unstructured environments.

Risk-Sensitive RL with ϕ-Divergence-Risk | *Paper Submitted to AAAI 2025* Nov. 2022 - May. 2023

- Defined a comprehensive ϕ-divergence risk measure that accommodates a broad spectrum of objectives in risk-sensitive RL; developed a novel policy gradient algorithm specifically tailored to optimize these risk measures.
- Performed a near-optimal convergence analysis, rigorously modeling the decision-maker's risk preferences to enhance the algorithm's applicability in industry, such as portfolio optimization and supply chain management.