Yixuan Li

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Education

Southeast University **Sep. 2022 – Jun. 2025**
Master of Computer Science, GPA: 86.38 *Nanjing, China*
Advisor: Prof. Wanyuan Wang

Nanjing University of Posts and Telecommunications **Sep. 2018 – Jun. 2022**
Bachelor of Computer Science, GPA: 86.36 *Nanjing, China*
Advisor: Dr. Kang Xu

Research Interests

Machine Learning; Reinforcement Learning; Operation Research; Multi-Agent Systems
My research outputs now include 5 publications accepted, 2 work in progress, and one granted patent.

Publications

1. **Factor Graph Neural Network Meets Max-Sum: A Real-Time Route Planning Algorithm for Massive-Scale Trips**, Proceedings of the 23rd International Conference on Autonomous Agents and Multi-Agent Systems (*AAMAS'24*)
   Yixuan Li, Wanyuan Wang, Weiyi Xu, Yanchen Deng, Weiwei Wu.*
   - Designed a novel modeling approach: the Path-Query Factor Graph for global route planning problems;
   - Proposed a hybrid pruning technique to accelerate Max-Sum algorithm in different traffic conditions;
   - Developed an end-to-end, real-time response framework based on the factor graph neural networks.
2. **Decentralized Subgoal Tree Search for Multi-agent Planning without Priors or Communication**, Proceedings of the 19th International Conference on Mobility, Sensing and Networking (*MSN'23*)
   Qian Che, Yixuan Li, Ziyao Peng, Wanyuan Wang, Yichuan Jiang.*
   - Improved distributed tree search algorithm by upstream planning to automatically extract sub-goals;
   - Introduced an expectation alignment technique to extend algorithm to non-communication scenarios.
3. **A Multi-agent Based Method for Large-Scale Route Planning Using Distributed Constraint Optimization**, The 6th IEEE International Conference on Unmanned Systems (*ICUS'23*)
   Yixuan Li, Qian Che, Fengchen Wang, Yifeng Zhou, Chuanyou Li, Wanyuan Wang.*
   - Modeled the large-scale path planning problems as Distributed Constraint Optimization Problems.
4. **Explicit Coordination Based Multi-Agent Reinforcement Learning for Intelligent Traffic Signal Control**, 18th CCF Conference on Computer Supported Cooperative Work and Social Computing
   Yixuan Li, Qian Che, Yifeng Zhou, Wanyuan Wang, Yichuan Jiang.*
   - Enhanced inter-agent information sharing by predicting traffic flow and neighboring traffic light phases.
5. **A Method for Security Traffic Patrolling Based on Structural Coordinated Proximal Policy Optimization**, 18th CCF Conference on Computer Supported Cooperative Work and Social Computing
   Yixuan Li, Qian Che, Fengchen Wang, Huiying Zhang, Wanyuan Wang, Yichuan Jiang.*
   - Designed an efficient Shapley value decomposition method for reward function by local relationship.
6. **A Method for Fault Root Cause Localization Based on Network Topology and Real-Time Alarms**, China Invention Patent No. CN112181758B, Granted on 2023.
   Kang Xu, Yixuan Li, Haiqi Liu, Xiaowei Zhang, Ning Ye, Ruchuan Wang.
   - Devised a framework for root cause identification based on alarm nodes and their hierarchical topology.

7. **Multiagent Reinforcement Learning-Based Flow Splitting for Network Packet Routing**. Recommended to a JCR Q1 Journal, Under review
Qian Che†, Yixuan Li†, Yijing Wang, Haoran Chen, Wanyuan Wang, Weiwei Wu*.*
   - Developed a novel multiagent modeling approach by representing traffic demand as agents.
   - Designed an attention-based pointer network to enhance feature extraction.

8. **Fast and Interpretable Mixed Integer Program Solving by Learning Parsimonious Strategy**. To be submitted to AAAI
*Yixuan Li, Qian Che, Jiahui Duan, Xiongwei Han, Wanyuan Wang**
   - Designed an interpretable model parsimonious strategy and a strategy pruning method for MIP.
   - Designed an efficient solving method through preference-based reinforcement learning.

Research Projects

Accelerating Large-Scale Supply Chain Problem Solving **Jan. 2023 – Jun. 2025**
Huawei Technologies Co., Ltd. *Shenzhen, China*

- Developed a solver acceleration method based on parsimonious model for CO, predicted integers and identified active constraints to reduce the number of redundant constraints for a rapid solution.
- Reduced solution time to milliseconds on Huawei's real-world scenarios while ensuring 99% fidelity.
- With the warm start technology, achieved over ten times speed improvement on average compared to CPLEX under the same solution gap, won the Huawei Spark Award, advancing a collaborative project.

DRL Based Data Center Cooling System Optimization **Sep. 2022 – Dec. 2023**
China Mobile Communications Group Co., Ltd *Wuxi, China*

- Trained a thermodynamic model of the cooling system using GNN and the relationship of the units.
- Designed a DRL-based control algorithm for cooling systems by DDPG with imitation learning.
- Test results showed a total power usage effectiveness (PUE) reduction of 35% compared to the original scheme, successfully deployed at the China Mobile Wuxi Data Center.

Multi-Agent Coordinated RL Based Traffic Signal Control **Mar. 2022 – Sep. 2022**
China Computer Federation (CCF) and Tencent *Nanjing, China*

- Established a value function between agents to explicitly quantify the impact of neighbours.
- Utilized a message-passing algorithm based on relational collaboration graphs for decision making.
- Designed an efficient Shapley value decomposition reward function based on local interaction structures to promote cooperation. Published three EI-indexed conference papers as the first author.

Intelligent Anomaly Detection and Root Cause Localization **Jan. 2020 – Jun. 2022**
State Key Laboratory of Smart Grid Protection and Control, NARI Group *Nanjing, China*

- Designed a suite of anomaly detection algorithms based on statistical modeling, machine learning, and deep learning for multivariate time series. Techniques applied include GNN, Transformer, GAN, etc.
- Contributed to two papers and one patent, with both papers accepted by SCI-JCR Q2 journals.

Awards

- 2023 Nov, Southeast University, Scholarship
- 2023 Jul, Huawei Spark Award, Value Prize
- 2023 Jan, China Graduate Mathematical Contest in Modeling, National Third Prize
- 2022 Nov, Southeast University, Scholarship
- 2022 Apr, Alibaba Cloud Panjiu Intelligent Algorithm Competition, Global Top 3%
- 2021 Nov, "Challenge Cup" Academic Science and Technology Competition, National First Prize
- 2020 Dec, Nanjing University of Posts and Telecommunications, Scholarship
- 2020 Oct, "Yuezuan Cup" Software Design Competition, Third Prize

Technical Skills

Languages: Python, C/C++, Java, Julia, SQL
Frameworks: Pytorch, Gym, PyDCOP, PyG, CVXPY, CPLEX, Gurobi, SCIP, MySQL, Git, Redis