JINHAO LIANG

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RESEARCH INTERESTS

I am particularly interested in integrating generative AI with optimization to address complex scientific and engineering challenges. Currently, my research topics focus on developing algorithms to ensure the output of diffusion models satisfying constraints with provably guarantees by introducing differentiable optimization techniques into diffusion process. Specifically, I aim to tackle challenges in critical domains such as power systems and robotics, contributing to scalable and adaptive solutions for real-world applications.

EDUCATION

University of Virginia (UVA) Ph.D. in Computer Science Advisor : Prof. Ferdinando Fioretto	Sep. 2024 - Now GPA: -/4.00
The Chinese University of Hong Kong, Shenzhen (CUHKSZ) M.Phil in Computer and Information Engineering Advisor: Prof. Chenye Wu	Sep. 2022 - Jul. 2024 GPA: 3.90/4.00
Xidian University (XDU) B.E. in Software Engineering	Sep. 2018 - Jun. 2022 GPA: 3.70/4.00

PUBLICATIONS

Working Papers

1. Jinhao Liang, Jacob K. Christopher, Sven Koenig and Ferdinando Fioretto, "Multi-Agent Path Finding in Continuous Spaces with Projected Diffusion Models."

Journal Articles

- 1. Jinhao Liang, Wenqian Jiang, Chenbei Lu and Chenye Wu, "Joint Chance-constrained Unit Commitment: Statistically Feasible Robust Optimization with Learning-to-Optimize Acceleration." accepted by *IEEE Transactions on Power Systems*, 2024. (JCR Q1)
- Chenbei Lu, Jinhao Liang, Nan Gu, Haoxiang Wang and Chenye Wu, "Manipulation-Proof Virtual Bidding Mechanism Design." accepted by *IEEE Transactions on Energy Markets*, *Policy and Regulation*, 2023.
- Chenbei Lu, Jinhao Liang, Wenqian Jiang, Jiaye Teng and Chenye Wu, "High-Resolution Probabilistic Load Forecasting: A Learning Ensemble Approach." accepted by Journal of the Franklin Institute, 2023. (JCR Q1)

Conference Proceedings

- 1. Jinhao Liang, Chenbei Lu, Wenqian Jiang and Chenye Wu, "Few-shot Residential Load Forecasting Boosted by Learning to Ensemble." accepted by the 7th IEEE Conference on Energy Internet and Energy System Integration (EI²), 2023
- 2. Wenqian Jiang, Jinhao Liang, Chenbei Lu and Chenye Wu, "Robust Online EV Charging Scheduling with Statistical Feasibility." accepted by the 62nd IEEE Conference on Decision and Control (CDC), 2023

3. Jinhao Liang, Wenqian Jiang and Chenye Wu, "Effective Carbon Tax Learning via Cap and Trade." accepted by *IEEE 5th International Electrical and Energy Conference (CIEEC)*, 2022

SELECTED RESEARCH EXPERIENCE

Multi-Agent Path Finding in Continuous Spaces with Projected Diffusion Models

Supervior: Prof. Ferdinando Fioretto

- Introduced a novel formulation of Multi-Agent Path Finding (MAPF) in continuous spaces using diffusion models, enabling the simultaneous generation of trajectories for all agents in a single framework
- Adapted projected diffusion models (PDM) for MAPF by embedding constraints directly into the diffusion process, ensuring that the generated solutions are feasible and collision-free.
- Developed an augmented Lagrangian approach to accelerate the projection process, making the method scalable and practical for real-world applications.

Joint Chance-constrained Unit Commitment with Statistical Feasibility

Supervior: Prof. Chenye Wu

Oct. 2022 - Jun. 2023

Sep. 2024 - Dec. 2024

- Extended the notion of statistical feasibility into unit commitment, a mixed-integer problem, and formulated the statistically feasible unit commitment.
- Developed sample-based uncertainty set construction algorithms, yielding less conservative solutions.
- Accelerated the solving process and designed the optimization kernel to boost its computational efficiency further.

An Ensemble Approach for Probabilistic Load Forecasting

Supervior: Prof. Chenye Wu

Jun. 2022 - Jul. 2023

- Proposed the ensemble framework, which can capture the optimal nonlinear combination of different single models.
- Developed the clustering-based few-shot methods to augment the data if data is limited.
- Demonstrated the performance guarantee of ensemble framework and clustering-based few-shot methods.

ACADEMIC SERVICES

PC Member

• IEEE Conference on Energy Internet and Energy System Integration (EI²)

Reviewer

- International Conference on Autonomous Agents and Multiagent Systems (AAMAS)
- Applied Energy
- IEEE Transactions on Energy Markets, Policy, and Regulation
- \bullet IET Generation, Transmission & Distribution
- Data Science and Management

SELECTED HONORS

Presidential Award for Outstanding Graduate Students (top 10 in CUHKSZ)	Nov.	2024
Provost Fellowship (top graduate students in UVA)	Nov.	2024
Modern Chinese Scientists Scholarship (top 12 in XDU)	Jan.	2022
National Scholarship $(2\%$ in XDU)	Dec.	2021

SKILLS

Programming Languages and Frameworks Python, Pytorch, MATLAB

Languages

Chinese: native; English: professional working proficiency