

FEI LIU

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RESEARCH INTERESTS

I am currently a Postdoctoral Researcher at City University of Hong Kong working with Prof. Qingfu Zhang. I work on *computational intelligence, optimization, and their real-world applications*.

Recently, I am pretty interested in the *intersection of machine learning and optimization algorithms*. I have been focused on developing generalized *neural combinatorial optimization (NCO)* methods and *large language model (LLM)*-driven problem-solving systems.

EDUCATION

City University of Hong Kong (CityU) , Hong Kong SAR Ph.D. in Computer Science Advisor: <i>Prof. Qingfu Zhang</i> , IEEE Fellow, Chair Professor	2020.09 – 2025.03
Northwestern Polytechnical University (NPU) , Shaanxi, China M.Sc. in Fluid Mechanics Advisor: <i>Prof. Zhonghua Han</i>	2017.09 – 2020.04
Northwestern Polytechnical University (NPU) , Shaanxi, China B.Eng. in Aircraft Airworthiness Technology	2013.09 – 2017.07

SELECTED AWARDS

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| • <i>Second Price (Only One, Team Leader)</i> , IEEE FLAME Challenge | 2024 |
| • <i>Champion</i> , IEEE HK CI Postgraduate Student Research Paper Competition | 2024 |
| • <i>Outstanding Master's Thesis Award</i> , Chinese Society of Aeronautics and Astronautics | 2021 |
| • <i>Gold Award</i> , EMO 2021 HUAWEI Logistic Competition | 2021 |

EXPERIENCES

City University of Hong Kong (CityU) , Hong Kong SAR Teaching Assistant, Department of Computer Science	2021 – 2023
Universidad Politécnica de Madrid (UPM) , Madrid, Spain Exchange Student, Department of Applied Mathematics in Aerospace Engineering Advisor: <i>Prof. Ignacio Gómez Pérez</i>	2016.01 – 2016.07

1. **Fei Liu**, Xialiang Tong, Mingxuan Yuan, Xi Lin, Fu Luo, Zhenkun Wang, Zhichao Lu, and Qingfu Zhang. Evolution of heuristics: towards efficient automatic algorithm design using large language model. *International Conference on Machine Learning (ICML)*, 2024 (**Oral, Accept Rate Top 1.52%**)
2. **Fei Liu**, Xi Lin, Weiduo Liao, Zhenkun Wang, Qingfu Zhang, Xialiang Tong, and Mingxuan Yuan. Prompt learning for generalized vehicle routing. *33th International Joint Conference on Artificial Intelligence (IJCAI)*, 2024
3. **Fei Liu**, Xi Lin, Qingfu Zhang, Xialiang Tong, and Mingxuan Yuan. Multi-task learning for routing problem with cross-problem zero-shot generalization. *ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (SIGKDD)*, 2024
4. **Fei Liu**, Qingfu Zhang, Qingling Zhu, Xialiang Tong, and Mingxuan Yuan. Machine learning assisted multiobjective evolutionary algorithm for routing and packing. *IEEE Transactions on Evolutionary Computation*, 2024 (**Q1, IF 11.7**)
5. **Fei Liu**, Zhong-Hua Han, Yang Zhang, Ke Song, Wen-Ping Song, Feng Gui, and Ji-Bin Tang. Surrogate-based aerodynamic shape optimization of hypersonic flows considering transonic performance. *Aerospace Science and Technology*, 93:105345, 2019 (**Q1, IF 5.0**)
6. Zhuoliang Xie*, **Fei Liu***, Genghui Li, Zhilin Mao, Yu Zhang, Zhenkun Wang, and Qingfu Zhang. Multi-population optimization with LLM-driven knowledge discovery for large-scale HFVRP. *IEEE Transactions on Computational Social Systems*, 2025 (**Q1, IF 4.5, Equal Contribution**)
7. Han Li*, **Fei Liu***, Zhi Zheng, Yu Zhang, and Zhenkun Wang. Cada: cross-problem routing solver with constraint-aware dual-attention. *International Conference on Machine Learning (ICML)*, 2025 (**Equal Contribution**)
8. Shunyu Yao*, **Fei Liu***, Xi Lin, Zhichao Lu, Zhenkun Wang, and Qingfu Zhang. Multi-objective evolution of heuristic using large language model. *Proceedings of the AAAI Conference on Artificial Intelligence (AAAI)*, 2025 (**Oral, Equal Contribution**)
9. Yu Zhang, Kefeng Zheng, **Fei Liu[†]**, Qingfu Zhang, and Zhenkun Wang. AutoTurb: using large language models for automatic algebraic model discovery of turbulence closure. *Physic of Fluids*, 2025 (**Q1, IF 4.1, Corresponding Author**)
10. **Fei Liu**, Qingfu Zhang, and Zhonghua Han. MOEA/D with gradient-enhanced kriging for expensive multiobjective optimization. *Natural Computing*, 22(2):329–339, 2023 (**Q2, IF 1.7**)
11. **Fei Liu**, Xi Lin, Zhenkun Wang, Shunyu Yao, Xialiang Tong, Mingxuan Yuan, and Qingfu Zhang. Large language model for multi-objective evolutionary optimization. *International Conference on Evolutionary Multi-Criterion Optimization (EMO)*, 2025
12. **Fei Liu** and Qingfu Zhang. A two-stage algorithm for integer multiobjective simulation optimization. In *International Conference on Evolutionary Multi-Criterion Optimization (EMO)*, pages 17–28. Springer, 2023
13. **Fei Liu**, Yiming Yao, Ping Guo, Zhiyuan Yang, Xi Lin, Xialiang Tong, Mingxuan Yuan, Zhichao Lu, Zhenkun Wang, and Qingfu Zhang. A systematic survey on large language models for algorithm design. *arXiv preprint arXiv:2410.14716*, 2024 (Under Review)
14. **Fei Liu**, Rui Zhang, Zhuoliang Xie, Rui Sun, Kai Li, Xi Lin, Zhenkun Wang, Zhichao Lu, and Qingfu Zhang. LLM4AD: a platform for algorithm design with large language model. *arXiv preprint arXiv:2412.17287*, 2024 (Under Review)
15. Kefeng Zheng, Yiheng WANG, **Fei Liu**, Qingfu ZHANG, and Wenping SONG. CST-LLM: enhancing airfoil parameterization method with large language model. *Aerospace Science and Technology*, 2025

16. Zidong Wang, **Fei Liu**, Qi Feng, Qingfu Zhang, and Xiaoguang Gao. Llm-enhanced score function evolution for causal structure learning. *34th International Joint Conference on Artificial Intelligence (IJCAI)*, 2025
17. Ping Guo, Cheng Gong, Xi Lin, **Fei Liu**, Zhichao Lu, Qingfu Zhang, and Zhenkun Wang. MOS-Attack: a scalable multi-objective adversarial attack framework. *Conference on Computer Vision and Pattern Recognition (CVPR)*, 2025
18. Ke Li, **Fei Liu**, Zhenkun Wang, and Qingfu Zhang. Destroy and repair using hyper-graphs for routing. In *Proceedings of the AAAI Conference on Artificial Intelligence (AAAI)*, volume 39, pages 18341–18349, 2025
19. Zhuoliang Xie, **Fei Liu**, Zhenkun Wang, and Qingfu Zhang. LLM-driven neighborhood search for efficient heuristic design. In *2025 IEEE Congress on Evolutionary Computation (CEC)*, pages 1–8. IEEE, 2025
20. Yiming Yao, **Fei Liu**, Ji Cheng, and Qingfu Zhang. Evolve cost-aware acquisition functions using large language models. *PPSN*, 2024 (**Best Paper Nomination**)
21. Rui Zhang, **Fei Liu**, Xi Lin, Zhenkun Wang, Zhichao Lu, and Qingfu Zhang. Understanding the importance of evolutionary search in automated heuristic design with large language models. In *International Conference on Parallel Problem Solving from Nature*, pages 185–202. Springer, 2024
22. Bo Xue, Ji Cheng, **Fei Liu**, Yimu Wang, and Qingfu Zhang. Multiobjective lipschitz bandits under lexicographic ordering. In *Proceedings of the AAAI Conference on Artificial Intelligence (AAAI)*, 2024
23. Xi Lin, Xiaoyuan Zhang, Zhiyuan Yang, **Fei Liu**, Zhenkun Wang, and Qingfu Zhang. Smooth tchebycheff scalarization for multi-objective optimization. *International Conference on Machine Learning (ICML)*, 2024
24. Yiming Yao, **Fei Liu**, and Qingfu Zhang. High-throughput multi-objective bayesian optimization using gradients. In *2024 IEEE Congress on Evolutionary Computation (CEC)*, pages 1–8. IEEE, 2024
25. Fu Luo, Xi Lin, **Fei Liu**, Qingfu Zhang, and Zhenkun Wang. Neural combinatorial optimization with heavy decoder: toward large scale generalization. *Advances in Neural Information Processing Systems*, 36, 2024
26. Ping Guo, **Fei Liu**, Xi Lin, Qingchuan Zhao, and Qingfu Zhang. L-AutoDA: leveraging large language models for automated decision-based adversarial attacks. *GECCO*, 2024
27. Yiwen Wang, **Fei Liu**, and Qingfu Zhang. A decomposition-based hybrid algorithm for multi-objective vehicle routing problem with time windows. *IEEE Congress on Evolutionary Computation*, 2023
28. Zhonghua Han, **Fei Liu**, Chengzhou Xu, Keshi Zhang, and Qingfu Zhang. Efficient multi-objective evolutionary algorithm for constrained global optimization of expensive functions. *IEEE Congress on Evolutionary Computation*, 2019
29. Bei Liu, Hua Liang, Zhonghua Han, Yinghong Li, **Fei Liu**, Jiangbo Chi, and Zhiwen Ding. Numerical research on airfoil transition delay by alternative current dielectric barrier discharge actuation. *Chinese Journal of Aeronautics*, 2019
30. **Fei Liu**, Xialiang Tong, Mingxuan Yuan, and Qingfu Zhang. Algorithm evolution using large language model. *arXiv preprint arXiv:2311.15249*, 2023
31. **Fei Liu**, Chengyu Lu, Lin Gui, Qingfu Zhang, Xialiang Tong, and Mingxuan Yuan. Heuristics for vehicle routing problem: a survey and recent advances. *arXiv preprint arXiv:2303.04147*, 2023

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