IEEE Transactions on Evolutionary Computation

Exact and Deep Q-network Assisted Swarm Intelligence Methods for Scheduling Multi-objective Heterogeneous Unmanned Surface Vehicles

澳門科技大學 MACAU UNIVERSITY OF SCIENCE AND TECHNOLOGY

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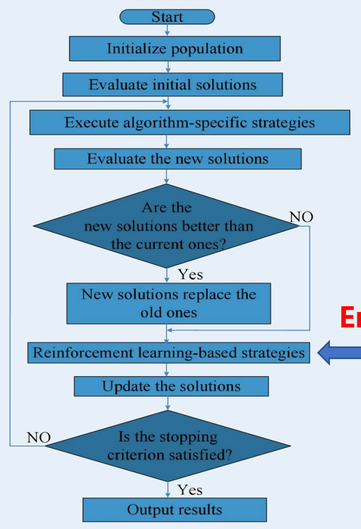
Research Direction and Methods

Research Direction

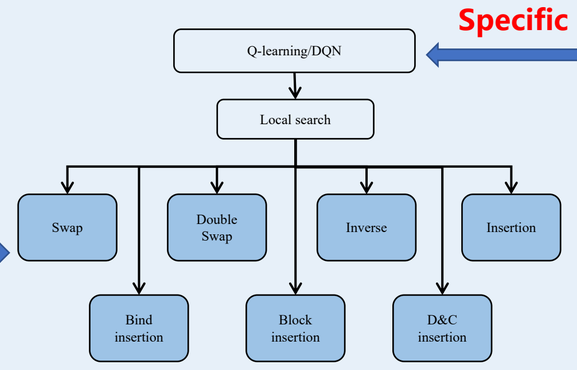
Artificial Intelligence; Intelligent Optimization Theory, Method and Application; Reinforcement Learning; Complex Systems Modeling, Optimization and Scheduling.

智能協同優化



Swarm and evolutionary algorithm

Ensemble

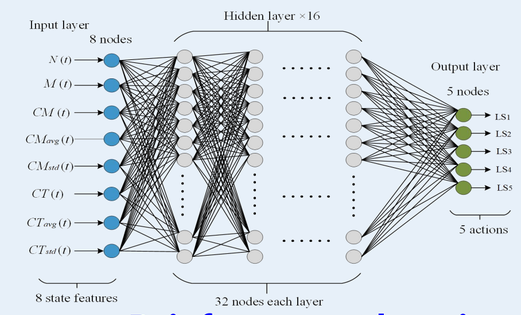


Specific

Problem-specific knowledge

Q-table

State \ Action	LS1	LS2	LS3	LS4	LS5
LS1	Q(LS1, LS1)	Q(LS1, LS2)	Q(LS1, LS3)	Q(LS1, LS4)	Q(LS1, LS5)
LS2	Q(LS2, LS1)	Q(LS2, LS2)	Q(LS2, LS3)	Q(LS2, LS4)	Q(LS2, LS5)
LS3	Q(LS3, LS1)	Q(LS3, LS2)	Q(LS3, LS3)	Q(LS3, LS4)	Q(LS3, LS5)
LS4	Q(LS4, LS1)	Q(LS4, LS2)	Q(LS4, LS3)	Q(LS4, LS4)	Q(LS4, LS5)
LS5	Q(LS5, LS1)	Q(LS5, LS2)	Q(LS5, LS3)	Q(LS5, LS4)	Q(LS5, LS5)

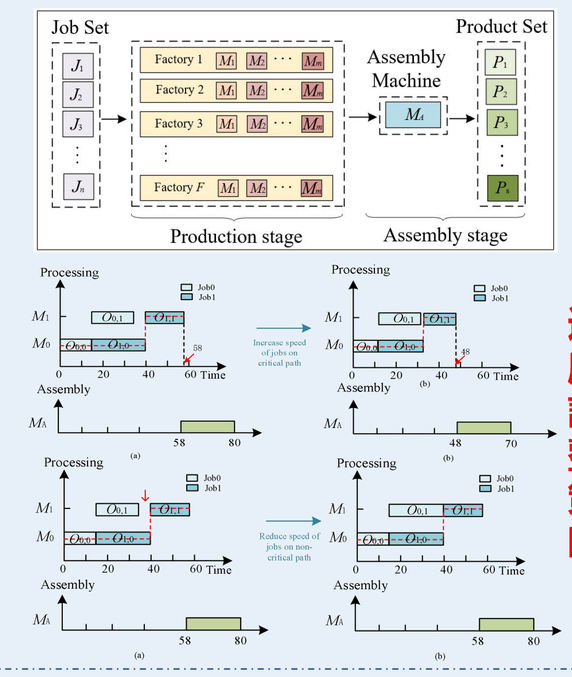


Reinforcement learning

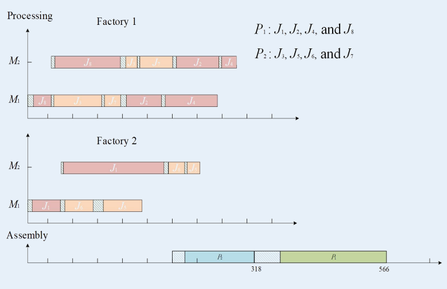
Representative Work

Representative Results

智能製造系統優化調度



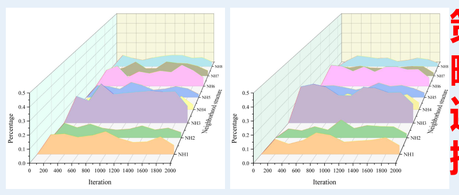
問題模型



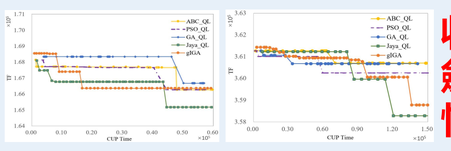
模型驗證

速度調整策略

策略選擇



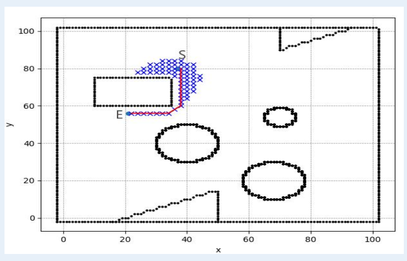
收斂性



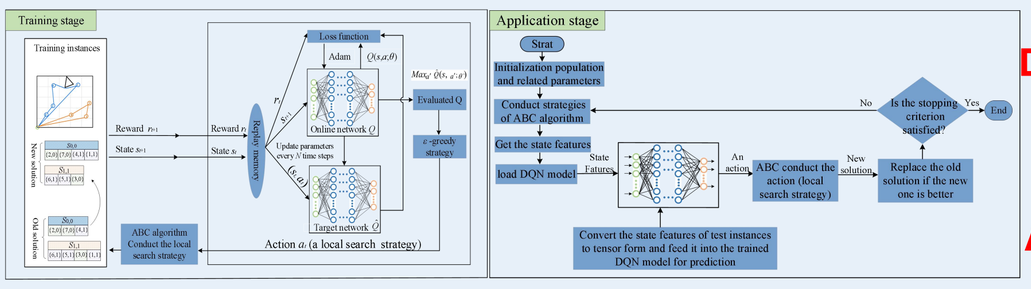
智能無人艇協同調度

任務分配

A*算法路徑規劃

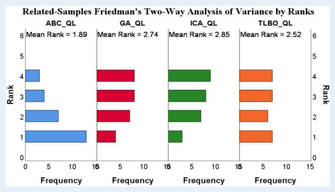


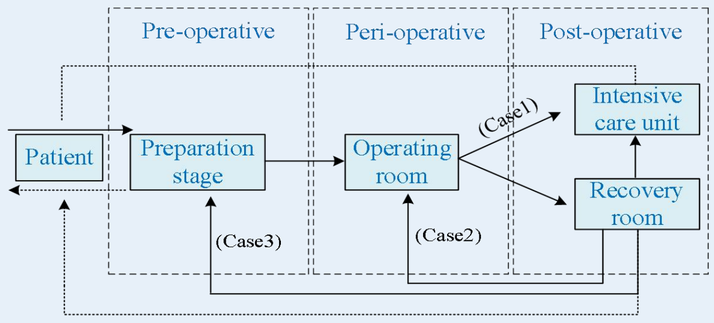
DQN輔助的ABC



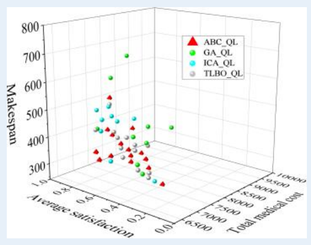
智能手術優化調度

統計測試





問題模型



多目標優化

Participating in Funded Projects

- Learning based collaborative intelligent scheduling and rescheduling for remanufacturing with uncertain, FDCT, 0019/2021/A.
- Problem specific knowledge based intelligent scheduling and rescheduling for uncertain remanufacturing, NSFC, 62173356.
- USV intelligent collaborative and autonomous task allocation, Zhuhai, PI.
- Zhuhai Industry-University-Research Project with Hongkong and Macao, ZH22017002210014PWC.
- Guangdong Basic and Applied Basic Research Foundation, Guangdong, 2023A1515011531.

Representative Paper

[1] **H. Yu, K. Z. Gao**, Z. Ma, and L. Wang, "Exact and deep Q-network assisted swarm intelligence methods for scheduling multi-objective heterogeneous unmanned surface vehicles," ***IEEE Transactions on Evolutionary Computation***, Accept, doi: 10.1109/TEVC.2024.3415368. **(大學特級成果) (于輝第一作者，澳門科技大學第一單位，清華大學第二單位)**

[2] **H. Yu, K. Z. Gao**, Z. W. Li, and P. Y. Duan, "Double-learning-strategy-based evolutionary algorithm for scheduling multiobjective distributed assembly permutation flowshops with setup time," ***IEEE Transactions on Systems, Man, and Cybernetics: Systems***, vol. 55, no. 2, pp. 925-935, 2024. **(大學特級成果) (于輝第一作者，澳門科技大學第一單位，齊魯工業大學第二單位)**

[3] **H. Yu, K. Z. Gao**, N. Q. Wu, M. C. Zhou, P. N. Suganthan, and S. G. Wang, "Scheduling multiobjective dynamic surgery problems via Q-learning-based meta-heuristics," ***IEEE Transactions on Systems, Man, and Cybernetics: Systems***, vol. 54, no.6, pp. 3321-3333, 2024. **(大學特級成果) (于輝第一作者，澳門科技大學第一單位，浙江財經大學第二單位，卡塔爾大學第三單位)**

[4] **H. Yu, K. Z. Gao**, Z. Ma, and Y. Pan, "Improved meta-heuristics with Q-learning for solving distributed assembly permutation flowshop scheduling problems," ***Swarm and Evolutionary Computation,*** vol. 80, 101335, 2023. **(大學特級成果) (于輝第一作者，澳門科技大學第一單位，湖州職業技術學院第二單位)**

[5] **H. Yu, K. Z. Gao**, Z. W. Li, and P. N. Suganthan, "Energy-efficient multi-objective distributed assembly permutation flowshop scheduling by Q-learning based meta-heuristics," ***Applied Soft Computing,*** vol. 166, 112247, 2024. **(大學特級成果) (于輝第一作者，澳門科技大學第一單位，卡塔爾大學第二單位)**

[6] **H. Yu, K. Z. Gao**, N. Q. Wu, and P. N. Suganthan. "Ensemble meta-heuristics and Q-learning for staff dissatisfaction constrained surgery scheduling and rescheduling," ***Engineering Applications of Artificial Intelligence,*** vol. 134, 108668, 2024. **(大學特級成果) (于輝第一作者，澳門科技大學第一單位，卡塔爾大學第二單位)**

Honors/Awards

◆2024年第七屆智能優化與調度學術會議**優秀論文**二等獎

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