KUN LEI

✉ leikun980116@gmail.com   🌐 Lei-Kun.github.io   ⓞ github.com/Lei-Kun   📞 +86 17828196103

EDUCATION

Southwest Jiaotong University   **Chengdu, China**
M.S. Mechanical engineering, GPA: 81.61/100   *Sep 2019-May 2022*
- **Advisor**: Dr. Peng Guo and Dr. Yi Wang
- **Awards:** Excellent Master's Thesis (4/400)

Chengdu University   **Chengdu, China**
B.S. Mechanical engineering, GPA: 76.67/100   *Sep 2015-May 2019*

PUBLICATIONS & PREPRINTS

Uni-O4: Unifying Online and Offline Deep Reinforcement Learning with Multi-Step On-Policy Optimization
Preprint, Website   *2023*
Kun Lei, Zhengmao He*, Chenhao Lu*, Kaizhe Hu, Yang Gao, Huazhe Xu. * indicates equal contribution.

TLDR: We seamlessly integrate offline and online learning through an on-policy RL algorithm, attaining SOTA performance in simulated and real-world environments across both phases, all without the need for additional regularization.

Behavior proximal policy optimization
International Conference on Learning Representations (ICLR), Paper, Code   *2023*
Zifeng Zhuang*, **Kun Lei***, Jinxin Liu, Donglin Wang, Yilang Guo. * indicates equal contribution.

TLDR:We propose Behavior Proximal Policy Optimization (BPPO), which bases on on-policy method (PPO) and effectively solves offline RL without any extra constraint or regularization introduced.

Large-scale Dynamic Scheduling for Flexible Job-shop with Random New Job Arrival by Hierarchical RL.
IEEE Transactions on Industrial Informatics (IF: 12.3), Paper   *2023*
Kun Lei, Peng Guo, Yi Wang, Jian Zhang, Xiangyin Meng, Linmao Qian

TLDR: We propose a novel end-to-end DRL framework for complex large-scale dynamic flexible job-shop scheduling problems in near real-time. It is highly suitable for the modern manufacturing industry due to its fast inference and stability capability.

A Multi-action Deep Reinforcement Learning Framework for Flexible Job-shop Scheduling Problem.
Expert Systems with Applications (IF: 8.5), Paper, Code   *2022*
Kun Lei, Peng Guo, Wenchao Zhao, Yi Wang

TLDR: We formulate the flexible job-shop scheduling problem (FJSP) as a multiple Markov decision process and introduce a disjunctive graph representation of FJSP, using a graph neural network to embed.

Solve routing problems with a residual edge-graph attention neural network.
Neurocomputing (IF: 6.0), Paper, Code   *2022*
Kun Lei, Peng Guo, Yi Wang, Xiao Wu, Wenchao Zhao.

TLDR: A novel residual edge-graph attention network based on GNN and Transfomer is proposed for various combinatorial optimization problems with consideration of the edge information in graph structure and residual connections between layers.

WORK EXPERIENCE

Shanghai Qizhi institute, Affiliated with Tsinghua University. Working with Dr. Huazhe Xu.   **2023-**

Research Assistant
- I build Uni-O4, with a focus on data efficiency RL and the adaptation of neural agents, and the applications on real-world robots. Build Uni-O4.

Westlake University. Worked with Dr. Donglin Wang.   **2022-2023**

Research Assistant
- I build BPPO, using online on-policy RL algorithm PPO for solving offline issues without extra regularization.

TECHNICAL SKILLS

Languages: IELTS Band Score 7.0 (Listening 6.5, Reading 8.5, Writing 6.5, Speaking 6.0)

Developer Tools: Python, C++, and Latex

Technologies/Frameworks: Pytorch, JAX, Solidworks, Auto CAD

MISC. OPEN-SOURCE PROJECTS

Behavior proximal policy optimization (⭐ 42)
Public code release for "BPPO". 2023
https://github.com/Dragon-Zhuang/BPPO.

End-to-end-DRL-for-FJSP (⭐ 130)
Public code release for "A Multi-action Deep Reinforcement Learning Framework for Flexible Job-shop Scheduling Problem."
https://github.com/Lei-Kun/End-to-end-DRL-for-FJSP.

DRL-and-graph-neural-network-for-routing-problems (⭐ 90)
Public code release for "Solve routing problems with a residual edge-graph attention neural network." 2022
https://github.com/Lei-Kun/DRL-and-graph-neural-network-for-routing-problems.

Dispatching-rules-for-FJSP (⭐ 44)
Coed for dispatching rules for flexible job-shop scheduling problems." 2022
https://github.com/Lei-Kun/Dispatching-rules-for-FJSP.

MIP-model-for-FJSP-and-solved-by-Gurobi (⭐ 17)
Coed for solving MIP model using Gurobi." 2022
https://github.com/Lei-Kun/MIP-model-for-FJSP-and-solved-by-Gurobi.