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Deep Reinforcement Learning for the Dynamic Flexible Job Shop Scheduling Problem with Cost Optimization

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Abstract

We study the Dynamic Flexible Job Shop Scheduling Problem (DFJSSP), which is a well-known combinatorial optimization problem where new jobs arrive dynamically over time and have to be scheduled on a sequence of machines. Unlike most works that look at makespan or related criteria, we study a new cost minimization objective for the DFJSSP. We propose a new deep reinforcement learning method for scheduling and show that our method outperforms benchmark methods.

Keywords

Dynamic scheduling, production scheduling, cost optimization, deep reinforcement learning

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Biographies

Jinsheng Chen is a Research Scientist at the Advanced Remanufacturing and Technology Centre (ARTC), Agency for Science, Technology and Research (A*STAR) in Singapore. He holds a Bachelor of Arts degree in Mathematics from the University of Cambridge and a Master of Science and PhD in Operations Research from Columbia University. His research focuses on making good decisions under certainty and uses a variety of methodologies such as optimal control, stochastic models, queueing theory, and reinforcement learning. He is interested in applications to domains such as manufacturing, healthcare, and supply chain management.

Jiao Liu received the B.S. degree in process equipment and control engineering and the M.S. degree in power engineering and engineering thermophysics from the Taiyuan University of Technology, Taiyuan, China, in 2013 and 2016, respectively, and the Ph.D. degree in control science and engineering from Central South University, Changsha, China, in 2022. He is currently a Research Fellow with the School of Computer Science and Engineering, Nanyang

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