A dynamic job-shop scheduling model based on deep learning

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ABSTRACT

Ideally, the solution to job-shop scheduling problem (JSP) should effectively reduce the cost of manpower and materials, thereby enhancing the core competitiveness of the manufacturer. Deep learning (DL) neural networks have certain advantages in handling complex dynamic JSPs with a massive amount of historical data. Therefore, this paper proposes a dynamic job-shop scheduling model based on DL. Firstly, a data prediction model was established for dynamic job-shop scheduling, with long short-term memory network (LSTM) as the basis; the Dropout technology and adaptive moment estimation (ADAM) were introduced to enhance the generalization ability and prediction effect of the model. Next, the dynamic JSP was described in details, and three objective functions, namely, maximum makespan, total device load, and key device load, were chosen for optimization. Finally, the multi-objective problem of dynamic JSP scheduling was solved by the improved multi-objective genetic algorithm (MOGA). The effectiveness of the algorithm was proved experimentally.

ARTICLE INFO

Keywords:
Long short-term memory (LSTM);
Dynamic job-shop scheduling;
Multi-objective genetic algorithm (MOGA);
Adaptive moment estimation (ADAM)

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Article history:
Received 24 February 2021
Revised 4 March 2021
Accepted 8 March 2021

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