Buffer Design of Warehouse System

Buffer design is a very important issue in the design, optimization and management of warehouse systems. In warehouse systems, buffers are used to temporary storage area for jobs handover. Excessive buffers increase system redundancy and waste cost, while insufficient buffers lead to blocking and low profits. Therefore, buffers should be designed properly. However, because of complex and consistently variable jobs flow in warehouse systems, both the modeling and buffer design become very difficult. In addition, other factors such as service disciplines increase the analysis difficulty of warehouse systems.

The purpose of this study is to efficiently determine suitable buffer update locations and increase proper buffer size in warehouse systems to satisfy the desired throughput. We proposed a bottleneck-based variable neighborhood search algorithm to allocate buffers and obtain buffer design solution of warehouse systems. In the algorithm, a queue module-based throughput calculation approach is proposed to evaluate the effectiveness of the buffer design solution efficiently. Numerical examples show that the proposed algorithm is applicable to design buffers for warehouse systems efficiently. In the future, we will improve the proposed buffer design approach and make it more applicable to very large-scale warehouse systems.

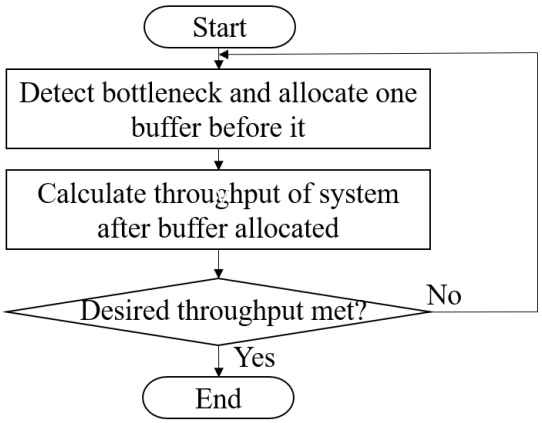

Figure 1. Framework of the proposed algorithm

Keywords: buffer design, warehouse systems, bottleneck, variable neighborhood search

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