

A Grouping Genetic Algorithm for the Order Batching Problem in Distribution Warehouses

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Abstract:

Order picking is a warehouse function that deals with the retrieval of articles from their storage locations in order to satisfy certain customer demands. Combining several single customer orders into one (more substantial) picking order can increase the efficiency of warehouse operations. The Order Batching Problem considered in this paper deals with the question of how different customer orders should be grouped into picking orders, such that the total length of all tours through the warehouse is minimized, which are necessary to collect all requested articles. For the solution of this problem, the authors introduce a Grouping Genetic Algorithm. This genetic algorithm is combined with a local search procedure which results in a highly competitive hybrid algorithm. In a series of extensive numerical experiments, the algorithm is benchmarked against a genetic algorithm with a standard item-oriented encoding scheme. The results show that the new genetic algorithm based on the group-oriented encoding scheme is preferable for the Order Batching Problem, and that the algorithm provides high quality solutions in reasonable computing times.