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Combinatorial Particle Swarm Optimization for solving Blocking Flowshop Scheduling Problem

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Abstract

This paper addresses to the flowshop scheduling problem with blocking constraints. The objective is to minimize the makespan criterion. We propose a hybrid combinatorial particle swarm optimization algorithm (HCPSO) as resolution technique for solving this problem. At the initialization, different priority rules are exploited. Experimental study and statistical analysis were performed to select the most adapted one for this problem. Then, the swarm behaviour is tested for solving a combinatorial optimization problem such as a sequencing problem under constraints. Finally, an iterated local search algorithm based on probabilistic perturbation is sequentially introduced to the particle swarm optimization algorithm for improving the quality of solution. The computational results show that our approach is able to improve several best known solutions of the literature. In fact, 76 solutions among 120 were improved. Moreover, HCPSO outperforms the compared methods in terms of quality of solutions in short time requirements. Also, the performace of the proposed approach is evaluated accroding to a real-world industrial problem.

Keywords: scheduling, blocking flowshop, particle swarm optimization, iterated local search, makespan

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1. Introduction

The automation of new production systems and the apparition of the robotic manufacturing have led to several application areas of the blocking

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