A Two-Phase Hybrid Particle Swarm Optimization Algorithm for Solving Permutation Flow-Shop Scheduling Problem

Abstract

In this paper, a two-phase hybrid particle swarm optimization algorithm (PRHPSO) is proposed for the permutation flow-shop scheduling problem (PFSP) with the minimizing makespan measure. The smallest position value (SPV) rule is used for encoding the particles that enable PSO for suitable PFSP, and the NEH and Tabu search algorithms are used for initializing the particles. In the first phase, the pattern reduction (PR) operator is used in the PSO algorithm for reducing the computation time. In order to avoid a premature convergence, a regeneration operator is used for escaping to the local optimal and balancing exploitation and exploration in the second phase. Additionally, a simulated annealing (SA) algorithm is utilized for local search to improve the best solution after the PSO search process. Finally, the results show that PRHPSO is significantly faster than two PSO-based algorithms and presents large-sized benchmarks.
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