

求解集合联盟背包问题的二次贪心变异乌鸦算法

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摘要: 针对确定性算法难以求解的集合联盟背包问题(Set-Union Knapsack Problem, SUKP), 提出了二次贪心变异乌鸦算法(quadratic greedy mutated crow search algorithm, QGMCSA)。首先结合 SUKP 问题模型对贪心策略进行改进, 提出了处理其潜在解的二次贪心修复和优化策略; 其次, 为了扩大乌鸦个体的搜索范围, 对乌鸦算法进行变异操作, 在跟踪过程中引入莱维飞行; 最后, 利用三类 SUKP 实例验证本文算法。仿真结果表明: QGMCSA 是比二进制人工蜂群算法求解 SUKP 的结果更优的一个高效算法。

关键词: 集合联盟背包问题; 乌鸦算法; 二次贪心修复与优化; 莱维飞行

Quadratic Greedy Mutated Crow Search Algorithm for Solving Set-Union Knapsack Problem

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Abstract: In order to solve the Set-Union Knapsack Problem (SUKP) which is difficult to be solved by the deterministic algorithm, the quadratic greedy mutated crow search algorithm (QGMCSA) is proposed. Firstly, the greedy strategy is improved by combining the SUKP model, and the quadratic greedy repair and optimization strategy is proposed to deal with its potential solutions. Secondly, in order to enlarge the search scope of the individual, Lévy flight is introduced into the tracking process of crow search algorithm. Finally three kinds of SUKP instances are used to verify the algorithm. Simulation results show that QGMCSA is better than binary artificial bee colony algorithm for solving SUKP, it is an effective algorithm.

Key words: set-union knapsack problem; crow search algorithm; quadratic greedy repair and optimization; Lévy flight

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