

大数据环境中简化粒子群算法的改进研究

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摘 要: 针对大数据存在的高维、强约束和多目标等复杂优化问题, 本文提出一种改进的群智能优化算法——狮群简化粒子群算法 (LSA-SPSO)。该算法将狮群算法的分组思想融入简化粒子群优化算法中, 将粒子分为三组寻优, 每组使用不同的学习因子和学习维度向量, 以此帮助种群执行不同的搜索机制, 从而增强了种群的多样性。此外, 引入种群育种, 有利于粒子跳出局部最优位置, 提高了算法的全局搜索性能。仿真实验表明, 本文提出的改进算法有效改善了传统群智能算法中存在的不足, 可以更好的应用到大数据中。

关键词: 大数据; 简化粒子群; 狮群算法; 分组; 学习因子; 学习维度向量; 种群育种

Improvement of simplified particle swarm optimization in big data environment

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Abstract: Aiming at the complex optimization problems such as high dimension, strong constraints and multi-objective in big data, an improved swarm intelligence optimization algorithm, Lions Simplified Particle Swarm Optimization (LSA-SPSO), is proposed in this paper. The algorithm integrates the grouping idea of Lions algorithm into the simplified particle swarm optimization algorithm, and divides the particles into three groups for optimization. Each group uses different learning factors and dimension vectors to help the population perform different search mechanisms, thus enhancing the diversity of the population. In addition, introducing population breeding can help the particles to jump out of the local optimum position and improve the global search performance of the algorithm. The simulation results show that the improved algorithm proposed in this paper effectively improves the shortcomings of traditional swarm intelligence algorithm, and can be better applied to big data.

Key words : big data; simplified particle swarm optimization; lions optimization; grouping; learning factor; learning dimension vector; population breeding

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