基于动态聚集距离的多目标粒子群优化算法及其应用Multi-objective Particle Swarm Optimization Algorithm Based on Dynamic Crowding Distance and Its Application

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关键词： 粒子群算法 多目标优化 改进的快速排序法 动态聚集距离 Pareto集

摘 要： 为了增加Pareto集的多样性，提高多目标优化的全局寻优能力，提出了一种基于动态聚集距离的多目标粒子群算法(DCD-MOPSO)。该算法利用改进的快速排序方法来减少计算量，采用动态变化的惯性权重和加速因子以增强算法的全局寻优能力，并基于动态聚集距离对外部集进行维护以增加Pareto集的多样性。通过典型测试函数的仿真实验和应用实例对DCD-MOPSO算法性能进行了分析，并与多目标优化算法MOPSO和NSGA-Ⅱ进行了比较。结果表明，DCD-MOPSO算法收敛速度较快，且得到的Pareto集分布均匀。 A multi-objective particle swarm optimization algorithm based on dynamic crowding distance (DCD-MOPSO) was proposed. Applying the improved quick sorting to reduce the time for computation, both the dynamic inertia weight and acceleration coefficients were used in the algorithm to explore the search space more efficiently. A new diversity strategy called dynamic crowding distance was used to ensure sufficient diversity amongst the solutions of the non-dominated fronts. Some benchmark functions and the optimization of four-bar plane truss were tested to compare with the performance of DCD-MOPSO and NSGA-Ⅱ. The results show that DCD-MOPSO has better convergence with even distributing of Pareto set.

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