

融入最佳叶节点的改进粒子群算法

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摘要: 针对目前传统粒子群算法早熟收敛、多维空间搜索精度不高的问题, 提出了一种逐级寻优的算法, 在该算法中, 基于树状的拓扑结构, 同时在速度更新公式中加入最优的叶子节点来平衡粒子全面搜索空间的能力. 这样有效地优化了空间搜索精度的问题, 又能使群中的粒子向局部最优值、全局最优值和叶子节点的最优值学习, 避免早熟收敛. 通过几个经典的基准测试函数仿真实验, 比较了几种不同算法的效率, 测试结果表明提出的新算法取得了很好的效果. 将改进的算法应用于图像匹配中, 提升了匹配的速度和准确率.

关键词: 粒子群算法; 树; 拓扑结构; 叶子节点; 图像匹配

An Improved Particle Swarm Optimization Algorithm

for Optimal Leaf Nodes

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Abstract: The topology of the particle swarm algorithm (PSO) can directly affect the performance of the algorithm, the neighborhood structure dynamic changes of particles to reach for the purpose of changing particles topology. In order to overcome the problem of the premature and low precision of the standard PSO, we present a tree topological structure using optimal leaf node to improve velocity update formula, while these particles explore the search space more broadly. A PSO algorithm using the tree topology able to solve the problem of space searching accuracy effectively, and can make particles study to local optima, the global optima and the optima of the leaf node used to avoid premature. Through several classic benchmark test function simulation, compares the efficiency of several different algorithms, the experimental results suggest that PSO algorithms using the tree topology are able to provide superior and more consistent performance over some existing PSO algorithms. The improved algorithm is applied to image matching, and the matching speed and accuracy are improved.

Key words: particle swarm optimization algorithm; tree; topological structure; leaf node; image matching

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