

求解函数优化问题的改进鲸鱼优化算法

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摘 要: 针对鲸鱼优化算法 (WOA) 易陷入局部最优、寻优精度低等问题, 提出一种改进的鲸鱼优化算法 (EWOA). 首先, 将自适应策略引入鲸鱼位置更新公式中, 以便平衡算法全局探索和局部开发能力的同时, 加快算法收敛速度、提高算法的寻优精度; 然后, 引入差分变异思想, 对较优的鲸鱼位置进行变异操作以避免算法陷入局部最优, 防止早熟收敛现象; 最后, 通过对 9 个基准测试函数在固定参数和不同维度的实验表明, 改进算法在寻优精度和收敛速度比传统算法均有显著提高, 尤其在高维函数的优化问题中表现出更好的收敛性能.

关键词: 鲸鱼优化算法; 自适应策略; 差分变异; 函数优化

An Enhanced Whale Optimization Algorithm for the

Problems of Function Optimization

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Abstract: To resolve the problem that the whale optimization algorithm (WOA) is easy to fall into local optimum and low precision, an enhanced whale optimization algorithm (EWOA) is proposed. Firstly, the adaptive strategy was introduced into the whale's position to balance the global exploration and local exploitation capabilities of the algorithm, speed up the convergence of the algorithm, and improve the optimization accuracy of the algorithm. Then, to avoid the algorithm falling into local optimum and prevent premature convergence, the idea of differential mutation was introduced to mutate the better whale's position. Finally, the experimental results on nine test functions under fixed parameters and different dimensions show that the improved algorithm has significantly improved search precision and convergence speed compared with the traditional WOA. Especially in the optimization problem of high-dimensional functions, the improved algorithm shows better convergence performance than the traditional WOA and its variants.

Key words: whale optimization algorithm; adaptive strategy; differential mutation; function optimization

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