

# 基于蚁群算法优化的布谷鸟搜索算法

张烈平, 何佳洁, 于滢琳, 杨振宇, 骆颖雄

(桂林理工大学 机械与控制工程学院, 广西 桂林 541004)

摘要: 针对标准布谷鸟搜索算法采用 Levy 飞行机制生成新的鸟巢, 使得每次更新的鸟巢位置的随机性较大的问题, 提出一种蚁群算法优化的布谷鸟搜索算法. 首先, 提出的算法将待更新的鸟巢位置作为蚁群优化算法的一组初始解在极小的范围内进行搜索寻优. 之后, 将此次蚁群优化算法搜索所得的解作为新的候选解. 当蚁群优化算法搜索寻优的候选解优于 Levy 飞行产生的候选解时, 替换掉 Levy 飞行的候选解. 最后, 再进行布谷鸟搜索算法择优算子, 根据遗弃概率替换新的鸟巢位置, 实现更新后的鸟巢位置更加趋向于最优解. 通过六个典型的测试函数将提出的算法与标准布谷鸟算法进行了寻优性能比较. 实验结果表明, 提出的算法能够提升布谷鸟搜索算法候选解的质量, 提高算法的收敛速度和收敛精度。

关键词: Levy 飞行; 布谷鸟搜索算法; 蚁群优化算法; 鸟巢位置更新策略

## A Cuckoo Search Algorithm Based on Ant Colony Algorithm

### Optimization

ZHANG Lie-ping, HE Jia-jie, YU Yan-lin, YANG Zhen-yu, LUO Ying-xiong

(College of Mechanical and Control Engineering, Guilin University of Technology, Guilin 541004, China)

Abstract: Aiming at the problem that standard cuckoo search algorithm using Levy flight mechanism to generate a new bird nest which makes the location of updated bird nest more randomly, a new cuckoo search algorithm based on ant colony algorithm optimization was proposed in this paper. Firstly, the location of the nest to be updated was used as a group of initial solutions of ant colony optimization algorithm to search and optimize in a minimal range in the proposed algorithm. After that, the solution optimized by the ant colony optimization algorithm was considered as a new candidate solution. And if the candidate solution optimized by the ant colony optimization algorithm was better than the candidate solution generated by Levy flight, the solution generated by Levy flight should be replaced with the candidate solution optimized by the ant colony optimization algorithm. At last, the optimal operator of the cuckoo search algorithm was used to replace the new nest location according to the abandoned probability, which could make the updated nest location more inclined to the optimal solution. The searching performance of proposed algorithm was compared with the standard cuckoo algorithm through six typical testing functions. Testing experimental results show that the proposed algorithm can improve the quality of the candidate solution of the cuckoo search algorithm and improve the convergence speed and the accuracy of the algorithm.

Key words: Levy flight, cuckoo search algorithm, ant colony algorithm, update strategy of bird nest location

作者简介:

张烈平男, (1971-), 博士, 教授. 研究方向为无线传感器网络、系统优化与调度. E-mail: 25761108@qq.com.

何佳洁女, (1992-), 硕士研究生. 研究方向为检测技术与自动化装置.

于滢琳女, (1993-), 硕士研究生. 研究方向为检测技术及自动化装置.

杨振宇男, (1993-), 硕士研究生. 研究方向为控制工程.

骆颖雄男, (1990-), 硕士. 研究方向为计算机应用.