

基于全局信息的人工蜂群聚类算法

邓玉婷, 宋 威, 马 伟

(江南大学 物联网工程学院, 江苏 无锡 214122)

摘 要: 针对人工蜂群算法易陷入局部最优和收敛速度慢的不足, 提出了一种基于全局信息的人工蜂群聚类算法. 基于全局信息的人工蜂群聚类算法通过加入食物源平均丰富度 (richness), 利用中间聚类效果, 更好地更新食物源; 并且通过引入全局最优信息, 提高跟随蜂的搜索效率, 以获取聚类问题的全局最优解. 同时在 UCI 机器学习库的 4 个标准数据集上进行了大量的实验来评估算法的性能. 并将该算法和基本人工蜂群算法、粒子群算法和 K-means 算法进行比较. 实验结果证明提出的基于全局信息的人工蜂群聚类算法具有更好的性能.

关键词: 人工蜂群算法; 聚类; 群体智能; 搜索策略; 全局信息

Artificial Colony Clustering Algorithm based on Global Information

Deng Yu-ting, Song Wei, Ma Wei

(School of Internet of Things Engineering, Jiangnan University, Wuxi 214122, China)

Abstract: An improved artificial bee colony algorithm was proposed for data clustering aiming at overcoming the shortcomings of being trapped in local optimum and slow convergence rate in this paper, called artificial colony clustering algorithm based on global information (GI-ABC). On the one hand, the modified algorithm added the average richness of food to the updating equation of food source, taking advantage of the intermediate clustering consequence to update the food source better. On the other hand, it utilized global information to improve the search efficiency of the onlooker bees, which contributed to getting the global optimum. Meanwhile, abundant experiments were conducted to evaluate it. In the experiments, four of topical real data sets selected from the UCI Machine Learning Repository were used to test the performance of the strategies compared with the other clustering algorithms, such as ABC algorithm, Particle Swarm Optimization (PSO) algorithm and K-means algorithm. The results indicate that the modified algorithm can generate better results than other algorithms and has better general performance.

Key words: artificial bee colony algorithm; clustering analysis; swarm intelligence; search strategy; global information

作者简介:

邓玉婷 女, (1990-), 硕士. 研究方向为群体智能、机器学习、数据挖掘. E-mail: dengyuting2015@qq.com.

宋 威 男, (1981-), 博士, 副教授. 研究方向为数据挖掘、模式识别、信息检索、人工智能.

马 伟 男, (1988-), 硕士. 研究方向为进化计算.