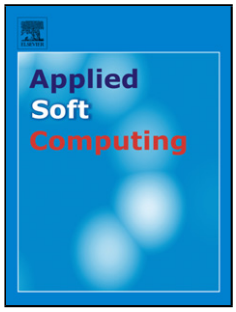

Title: A grey artificial bee colony algorithm

Author: Wan-li Xiang Yin-zhen Li Xue-lei Meng Chun-min Zhang Mei-qing An

PII: S1568-4946(17)30358-7
DOI: http://dx.doi.org/doi:10.1016/j.asoc.2017.06.015
Reference: ASOC 4284

To appear in: *Applied Soft Computing*

Received date: 13-11-2016
Revised date: 4-6-2017
Accepted date: 6-6-2017

Please cite this article as: Wan-li Xiang, Yin-zhen Li, Xue-lei Meng, Chun-min Zhang, Mei-qing An, A grey artificial bee colony algorithm, <*![CDATA[Applied Soft Computing Journal]]*> (2017), http://dx.doi.org/10.1016/j.asoc.2017.06.015

A grey artificial bee colony algorithm

Wan-li Xiang[a,*], Yin-zhen Li[a], Xue-lei Meng[a], Chun-min Zhang[a], Mei-qing An[a]

[a]*School of Traffic & Transportation, Lanzhou Jiaotong University,Lanzhou, Gansu 730070,PR China*

Abstract

Artificial bee colony (ABC) algorithm is a very popular population-based algorithm. Unfortunately, there exists a shortcoming of slow convergence rate, which partly results from random choices of neighbour individuals regarding its solution search equation. A novel scheme for the choice of neighbors is introduced based on grey relational degrees between a current individual and its neighbors to overcome the insufficiency. Then, the chosen neighbor is used to guide the search process. Additionally, inspired by differential evolution, a solution search equation called ABC/rand/2 is employed to balance the previous exploitation and a new perturbation scheme is also employed. What is more, solution search equations using information of the best individual, an opposition-based learning method and a chaotic initialization technique are also integrated into the proposed algorithm called grey artificial bee colony algorithm (GABC for short). Subsequently, the effectiveness and efficiency of GABC are validated on a test suite composed of fifty-seven benchmark functions. Furthermore, it is also compared with a few state-of-the-art algorithms. The related experimental results show the effectiveness and superiority of GABC.

Keywords:
Artificial bee colony algorithm, Grey relational analysis, Opposition-based learning, Chaotic initialization, Numerical Optimization

*Corresponding author.
Email address: xiangwl@tju.edu.cn (Wan-li Xiang)