Accepted Manuscript

A smart artificial bee colony algorithm with distance-fitness-based neighbor search and its application

Laizhong Cui, Kai Zhang, Genghui Li, Xizhao Wang, Shu Yang, Zhong Ming, Joshua Zhexue Huang, Nan Lu

PII: S0167-739X(18)31152-X
DOI: https://doi.org/10.1016/j.future.2018.06.054
Reference: FUTURE 4316

To appear in: *Future Generation Computer Systems*

Received date : 13 May 2018
Revised date : 4 June 2018
Accepted date : 27 June 2018

Please cite this article as: L. Cui, K. Zhang, G.H. Li, X. Wang, S. Yang, Z. Ming, J.Z. Huang, N. Lu, A smart artificial bee colony algorithm with distance-fitness-based neighbor search and its application, *Future Generation Computer Systems* (2018), https://doi.org/10.1016/j.future.2018.06.054

A smart artificial bee colony algorithm with distance-fitness-based neighbor search and its application

Laizhong Cui[1], Kai Zhang[1], Genghui Li*[1, 2], Xizhao Wang[1], Shu Yang[1], Zhong Ming[1], Joshua Zhexue Huang[1], Nan Lu[1]

[1]*College of Computer Science and Software Engineering, Shenzhen University, Shenzhen, P.R.China,*

[2]*Department of Computer Science, City University of Hong Kong, Hong Kong*

Abstract: Artificial bee colony (ABC) is a kind of biologically-inspired optimization technology, which has been successfully used in various scientific and engineering fields. To further improve the performance of ABC, some neighborhood structures defined by topology, distance or fitness information have been used to design the novel search strategies. However, the distance and fitness information have the potential benefits by building the better effectively neighborhood structure to balance the exploration and exploitation ability. Therefore, this paper proposes a new ABC variant with distance-fitness-based neighbor search mechanism (called DFnABC). To be specific, the employed bee exploits the information of a near-good-neighbor that not only has good fitness value but also is close to its own position to focus on the local exploitation around itself. Moreover, the selectable exploration scope of the employed bee decreases gradually with the process of the evolution and the search direction is guided by a randomly selected leader from the top Q solutions. In addition, each onlooker bee firstly selects a food source position that not only has high quality but also is far away from the current best position to search for the purpose of paying more attention to global exploration among the search space. Furthermore, the best neighbor's information of the selected food source position is used to generate the candidate solution. Through the comparison of DFnABC and some other state-of-the-art ABC variants on 22 benchmark functions, 28 CEC2013 test functions and 5 real life optimization problems, the experimental results show that DFnABC is better than or at least comparable to the competitors on majority of test functions and real life problems.

Keywords: Artificial bee colony algorithm, distance-fitness-based neighbor search, global numerical optimization, real life optimization problem

* Corresponding author
Email address: li_genghui@126.com, genghuili2-c@my.cityu.edu.hk (G.H. Li)
Phone: +852-98585094