Accepted Manuscript

A novel artificial bee colony algorithm with an adaptive population size for numerical function optimization

Laizhong Cui, Genghui Li, Zexuan Zhu, Quzhen Lin, Zhenkun Wen, Nan Lu, Ka-Chun Wong, Jianyong Chen

PII: S0020-0255(17)30754-5
DOI: 10.1016/j.ins.2017.05.044
Reference: INS 12914

To appear in: Information Sciences

Received date: 16 July 2016
Revised date: 25 May 2017
Accepted date: 28 May 2017

Please cite this article as: Laizhong Cui, Genghui Li, Zexuan Zhu, Quzhen Lin, Zhenkun Wen, Nan Lu, Ka-Chun Wong, Jianyong Chen, A novel artificial bee colony algorithm with an adaptive population size for numerical function optimization, Information Sciences (2017), doi: 10.1016/j.ins.2017.05.044

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.
A novel artificial bee colony algorithm with an adaptive population size for numerical function optimization

Laizhong Cui¹, Genghui Li*¹,², Zexuan Zhu¹, Qiuwen Lin¹, Zhenkun Wen¹, Nan Lu¹, Ka-Chun Wong², Jianyong Chen¹
¹College of Computer Science and Software Engineering, Shenzhen University, Shenzhen, PR.China,
²Department of Computer Science, City University of Hong Kong, Hong Kong

Abstract: The artificial bee colony (ABC) algorithm is a new branch of evolutionary algorithms (EAs) that is inspired by the collective foraging behavior of real honey bee colonies. Due to its foraging model and its solution search equation, ABC generally performs well in exploration but badly in exploitation. To address this concerning issue and obtain a good balance between exploration and exploitation, in this paper, we mainly introduce into the ABC an adaptive method for the population size (AMPS). AMPS is inspired by the natural principle that the size of a population is affected by the availability of food resources. When food resources are abundant, a population tends to expand; otherwise, a decrease in the availability of food resources leads to a shrinkage in the population size. Specifically, when the algorithm performs well in exploration, AMPS will shrink the population to enhance exploitation by periodically removing some inferior solutions that have low success rates. In contrast, AMPS will enlarge the population to improve exploration by introducing some reserved solutions. Furthermore, to make AMPS perform better, we design a new solution search equation for employed bees and onlooker bees. Moreover, we also improve the probability model of the onlooker bees. By embedding our three proposed algorithmic components into ABC, we propose a novel ABC variant, called APABC. To demonstrate the performance of APABC, we compare APABC with some state-of-the-art ABC variants and some other non-ABC methods on 22 scalable benchmark functions and 30 CEC2014 test functions. The simulation results show that APABC is better than or at least competitive with the competitors in terms of its solution quality, robustness and convergence speed.

Key words: Artificial bee colony algorithm, exploration and exploitation, adaptive method for the population size, solution search equation, probability model
دریافت فوری
متن کامل مقاله

<table>
<thead>
<tr>
<th>ISI Articles</th>
<th>مرحله‌بندی مقایسه ایران</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ امکان دانلود نسخه تمام متن مقالات انگلیسی</td>
<td>✓ امکان دانلود نسخه ترجمه شده مقالات</td>
</tr>
<tr>
<td>✓ پذیرش سفارش ترجمه تخصصی</td>
<td>✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله</td>
</tr>
<tr>
<td>✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله</td>
<td>✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب</td>
</tr>
<tr>
<td>✓ دانلود فوری مقاله پس از پرداخت آنلاین</td>
<td>✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات</td>
</tr>
</tbody>
</table>