Hindawi Publishing Corporation
Journal of Applied Mathematics
Volume 2013, Article ID 438158, 2 pages
http://dx.doi.org/10.1155/2013/438158

Editorial

Harmony Search and Nature-Inspired Algorithms for Engineering Optimization

Zong Woo Geem,[1] Xin-She Yang,[2] and Chung-Li Tseng[3]

[1] *Department of Energy and Information Technology, Gachon University, Seongnam 461-701, Republic of Korea*
[2] *Department of Design Engineering and Mathematics, Middlesex University, London NW4 4BT, UK*
[3] *The Australian School of Business, The University of New South Wales, Sydney, NSW 2052, Australia*

Correspondence should be addressed to Zong Woo Geem; geem@gachon.ac.kr

Received 7 November 2013; Accepted 7 November 2013

Since the emergence of swarm intelligence in the 1990s, especially the appearance of ant colony optimization and particle swarm optimization, nature-inspired algorithms started to mushroom [1–7]. In the last two decades, new optimization algorithms have become popular, and the algorithms such as harmony search [1, 2] and firefly algorithms [5] have shown to be superior and efficient. Significant progress has been made in a wide range of nature-inspired algorithms and their applications. Metaheuristics and swarm intelligence are becoming more popular for design optimization [3–5].

Most of these algorithms belong to evolutionary computation in general, and they have been developed and inspired from natural phenomenon. However, not all algorithms were inspired by nature. For example, harmony search, developed by Geem et al. in 2001, was inspired by the improvisation characteristics of a musician, and therefore, harmony search is a music-inspired algorithm [1, 2]. However, a vast majority of algorithms have been developed by mimicking the characteristics of biological systems in nature. For example, the firefly algorithm was developed by Yang in 2009 [5] and was inspired by the flashing patterns of tropical fireflies, while the cuckoo search was developed by Yang and Deb in 2010, inspired by the brooding parasitism of some cuckoo species [6]. The diversity of these algorithms and their applications has permeated into almost every area of engineering and industry [3–5].

The aim of this special issue is to review the latest developments in nature-inspired algorithms and their applications. The call for papers was well received, leading to a high number of submissions. After a rigorous peer-review process, sixteen high-quality papers have been selected. These papers represent a snapshot of the relevant research progress in these areas. Ten of the papers published in this special issue are dedicated to harmony search (HS) and the others to other types of nature-inspired algorithms. M. A. Al-Betar et al. present a new variant of HS, called cellular harmony search, to solve a set of 25 test functions with promising results. S. S. Im et al. also propose using cellular harmony search for unconstrained optimization. D. Oliva et al. use harmony search to carry out multilevel thresholding segmentation in image processing. Z. W. Geem demonstrates a parameter-setting-free version of harmony search and uses it to solve the economic dispatch of power plant operations. J. Fourie et al. carry out a comparative analysis of modern harmony search, providing new insights into the working mechanism of the method. R. Mallipeddi combines harmony search with differential evolution to enhance differential evolution by using parameter ensemble adaptation. In another paper, H.-Y. Yun et al. combine harmony search and ant colony optimization for traveling salesman problem. Furthermore, S. Lee et al. determine pavement rehabilitation activities by a permutation algorithm within the framework of harmony search. In the other two applications using harmony search, S. Lee et al. solve electroencephalography signal grouping, and D.-S. An et al. estimate parameters for traffic noise.

For those papers on nature-inspired algorithms, A. Gálvez and A. Iglesias use a firefly algorithm-based approach to do polynomial Bézier surface parameterization for