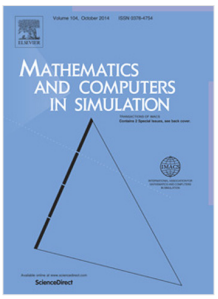
Accepted Manuscript



An Improved Non-dominated Sorting Genetic Algorithm-II (INSGA-II) applied to the design of DNA codewords

Yanfeng Wang, Yongpeng Shen, Xuncai Zhang, Guangzhao Cui, Junwei Sun

PII: S0378-4754(18)30072-7
DOI: https://doi.org/10.1016/j.matcom.2018.03.011
Reference: MATCOM 4558

To appear in: *Mathematics and Computers in Simulation*

Received date : 12 November 2009
Revised date : 11 November 2016
Accepted date : 28 March 2018

Please cite this article as: Y. Wang, Y. Shen, X. Zhang, G. Cui, J. Sun, An Improved Non-dominated Sorting Genetic Algorithm-II (INSGA-II) applied to the design of DNA codewords, *Math. Comput. Simulation* (2018), https://doi.org/10.1016/j.matcom.2018.03.011

An Improved Non-dominated Sorting Genetic Algorithm-II (INSGA-II) Applied to the Design of DNA Codewords

Yanfeng Wang*, Yongpeng Shen, Xuncai Zhang, Guangzhao Cui, Junwei Sun*

[a] *College of Electronic and Information Engineering, Zhengzhou University of Light Industry, Zhengzhou, 450002, China*
[b] *Henan Key Lab of Information-based Electrical Appliances, Zhengzhou University of Light Industry, Zhengzhou, 450002, China*

Abstract

DNA codewords design is critical for many research fields, from DNA computing, to DNA hybridization arrays, to DNA nanotechnology. Results in the literature rely on a wide variety of design criteria adapted to the particular requirements of each application. Since DNA codewords design can be regarded as a multi-objective optimization problem, and nondominated sorting genetic algorithm II (NSGA-II) has been demonstrated as one of the most efficient algorithms for multi-objective optimization problems, in this paper, we proposed an improved nondominated sorting genetic algorithm II (INSGA-II) for the design of DNA codewords. The novelty of our method is that introduced the constraints to the non-dominated sorting process. The performance of our method is compared with other DNA codewords design methods, and the experiment results in silico showed that the INSGA-II has a higher convergence speed and better population diversity than those of other algorithms, and can provide reliable and effective codewords for the controllable DNA computing.

Keywords: DNA Computing; DNA Codewords Design; Improved Nondominated Sorting Genetic Algorithm II (INSGA-II)

*Email:yanfengwang@yeah.net(Y. Wang), junweisun@yeah.net (J. Sun).