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Author: Hu Peng Zhaolu Guo Changshou Deng Zhijian Wu

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Enhancing differential evolution with random neighbors based strategy

Hu Peng[a,*], Zhaolu Guo[b], Changshou Deng[a], Zhijian Wu[c]

[a]*School of Information Science and Technology, Jiujiang University, Jiujiang 332005, PR China*
[b]*School of Science, Jiangxi University of Science and Technology, Ganzhou 341000, China*
[c]*State Key Lab of Software Engineering, School of Computer, Wuhan University, Wuhan 430072, PR China*

Abstract

As a powerful evolutionary algorithm for solving the tough global optimization problems, differential evolution (DE) has drawn more and more attention. However, how to make a proper balance between the global and local search is a perplexing question and greatly limit the optimization performance of DE. As we all known, there are two classical mutation strategies in DE, i.e., DE/rand/1 and DE/best/1. In DE/rand/1 strategy, the base vector is chosen from the population randomly, this means its better exploration and poor exploitation. The base vector of DE/best/1 strategy is the best one of the population and the strategy has better exploitation and poor exploration. To overcome these problems, this paper proposed a random neighbor based mutation strategy (DE/neighbor/1). For each individual of the population at each generation, the neighbors are chosen from the population in a random manner. The base vector of DE/neighbor/1 mutation strategy is the best one in the neighbors. On the basis of the new strategy, an enhancing differential evolution with DE/neighbor/1 (RNDE) is proposed. The experimental studies have been tested on 27 widely used benchmark functions and the results have proved that the proposed algorithm is competitive and promising.

Keywords: Differential evolution, Global optimization, Random neighbor, Exploration and exploitation

*Corresponding author
Email address: hu_peng@whu.edu.cn (Hu Peng)