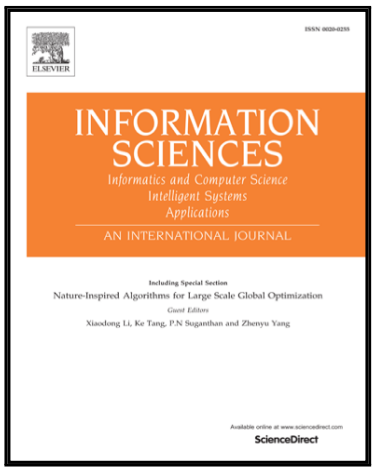

A new hybrid memetic multi-objective optimization algorithm for multi-objective optimization

Jianping Luo , Yun Yang , Qiqi Liu , Xia Li , Minrong Chen , Kaizhou Gao

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A new hybrid memetic multi-objective optimization algorithm for multi-objective optimization

Jianping Luo, Yun Yang, Qiqi Liu, Xia Li, Minrong Chen and Kaizhou Gao
College of Information Engineering, Shenzhen University, Shenzhen 518060, PR China
(Corresponding author: Jianping Luo, e-mail: ljp@szu.edu.cn, telephone/fax: 086-755-86573623)

Abstract: **To deal with the multi-objective optimization problems (MOPs), a meta-heuristic based on an improved shuffled frog leaping algorithm (ISFLA) which belongs to memetic evolution is presented. For the MOPs, both diversity maintenance and searching effectiveness are crucial for algorithm evolution. In this work, modified calculation of crowding distance to evaluate the density of a solution, memeplex clustering analyses based on a grid to divide the population, and new selection measure of global best individual are proposed to ensure the diversity of the algorithm. A multi-objective extremal optimization procedure (MEOP) is also introduced and incorporated into ISFLA to enable the algorithm to evolve more effectively. Finally, the experimental tests on thirteen unconstrained MOPs and DTLZ many-objective problems show that the proposed algorithm is flexible to handle MOPs and many-objective problems. The effectiveness and robustness of the proposed algorithm are also analyzed in detail.**

Index Terms: **Evolutionary computing, Hybrid computing, Multiple objective programming, algorithm diversity, shuffled frog leaping algorithm, extremal optimization.**

I. INTRODUCTION

Multiple conflicting objectives for optimization typically arise in science and engineering fields. Researchers and practitioners formulate such problems as multi-objective optimization problems (MOPs) to minimize or maximize several conflicting objective functions simultaneously. Presently, multi-objective evolutionary algorithms (MOEAs) are widely used for solving MOPs. The evolutionary methods in most