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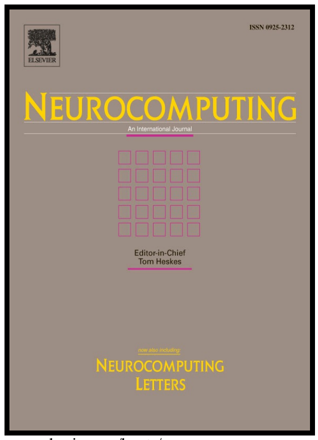

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A MOEA/D-based Multi-objective Optimization Algorithm for Remote Medical

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Abstract

Remote medical resources configuration and management involves complex combinatorial Multi-Objective Optimization problem, whose computational complexity is a typical NP problem. Based on the MOEA/D framework, this paper applies the two-way local search strategy and the new selection strategy based on domination amount and proposes the IMOEA/D framework, following which each individual produces two individuals in mutation. In this paper, by using a new selection strategy, the parent individual is compared with two mutated offspring individuals, and the more excellent one is selected for the next generation of evolution. The proposed algorithm IMOEA/D is compared with eMOEA, MOEA/D and NSGA-II, and experimental results show that for most test functions, IMOEA/D proposed is superior to the other three algorithms in terms of convergence rate and distribution.

Keywords: Remote Medical, Resource Assignment, Differential Mutation, Selection Strategy, Multi-objective Optimization, Test Problems

1. Introduction

With the rapid development of remote medical technology, making the patients remotely through the Internet to accept the doctor's diagnosis and treatment of follow-up is possible. As a result of medical resources scattered in different areas, and even across borders, and time zone. Therefore the allocation and scheduling of medical resources rationally, improve the utilization of medical resources and service quality, become the key point of remote medical technology. In the face of widespread and distributed medical resources management, we adopt multi-objective optimization algorithm for global optimization of resources allocation.

The differential evolution (DE) algorithm was first put forward by Storm R and Price K [1, 2] in 1955, and it has caught increasing attention of researchers due to its strengths in simple structure, stable performance, strong ability of global optimization, and easiness to understand. Differential evolution is a population-based global search algorithm, including initialization operation, mutation operation, repair operation, hybridization operation and selection operation. The differential evolution algorithm takes a certain rate of differential information of multiple individuals as disturbance quantity of individuals, so that the algorithm can be adaptive in leap distance and search direction [3] In early evolution, it has a large disturbance quantity due to large individual differences in the population, thus allowing the algorithm to search within a wide range and have a strong exploration ability [4]; in later evolution, when the algorithm tends to converge, it has a small population quantity due to small individual differences in the population, and the algorithm searches around the individual, which makes it have strong local mining capacity. It is because the differential evolution algorithm has the ability to learn from population individuals that it has unparalleled performance compared to other evolutionary algorithms.

The differential evolution algorithm was originally conceived for solving the Chebyshev polynomials problem [5], and later people found it effective in solving multi-objective optimization problems In recent years, researchers have been constantly improving the algorithm from various perspectives to obtain a more robust differential evolution algorithm. In terms of improvements of operators, Das *et al.* [6] advocated using two different methods for

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