
Abstract

Genetic Algorithm (GA) which was born in the 1970s became the start for experts to continue to build various metaheuristic algorithms to solve optimization problems. However, until now most metaheuristic algorithms generally have relatively low stability and scalability. A metaheuristic algorithm is usually very stable for finding the global optimum solution for certain problems, but less stable for other problems. Most algorithms are capable of solving low dimensional problems (tens or hundreds), but fail when the dimension scale is increased to thousands. To overcome these two problems, a high-performance algorithm called the Circle Search Algorithm (CSA) has recently been developed which is inspired by the geometric features of circles. For various reference function optimization problems, CSA has good performance in terms of stability and scalability, and has succeeded in finding global optimum solutions for most of the reference functions up to a thousand dimensions. However, the single population used by CSA makes the convergence speed relatively low. Therefore, this research proposes the Interactive Circle Algorithm (ICA), in which the population is divided into two interacting subpopulations, to increase the speed of convergence while maintaining stability and scalability. After being tested using 23 benchmark functions, ICA was able to obtain a minimum global value from 19 functions (more than the comparison algorithm). ICA also has high scalability because it is able to get minimum global values in high dimensions: hundreds and thousands.

Keywords: Interactive Circle Algorithm, Metaheuristic Algorithm, Subpopulation, Optimization Problems.
