
Abstract

To solve optimization problems, experts have built many stochastic-based metaheuristic algorithms. One of the best metaheuristic algorithms currently is the Komodo Mlipir Algorithm (KMA). In terms of stability, scalability, and parameter settings, KMA is quite good and relatively fast in terms of convergence. Unfortunately, sometimes the KMA is still stuck at the local optimum. In contrast, the Circle Search Algorithm (CSA) has a higher ability to avoid local optimum traps, but is less fast in terms of convergence. Therefore, this research developed a new algorithm called Intelligent Multi-strategy Algorithm (IMA), which combines the advantages of KMA and CSA to produce multiple and intelligent strategies to increase stability, scalability, adaptability of parameter settings, and convergence speed. IMA is designed by dividing the population into 4 subpopulations that carry out different search strategies and intelligently adjust parameters automatically according to the problem at hand. After being tested with 23 benchmark functions, IMA was able to obtain optimum values for 18 functions, higher than KMA (16 functions) and CSA (13 functions). IMA is able to achieve faster convergence than CSA. In addition, IMA is able to provide stability and scalability for high-dimensional functions.

Keywords: Intelligent Multi-strategy Algorithm, Metaheuristic Algorithm, Stability, Scalability, Adaptive parameter setting.
