Self-adaptive population sizing for a tune-free differential evolution

Abstract

The study and research of evolutionary algorithms (EAs) is getting great attention in recent years. Although EAs have earned extensive acceptance through numerous successful applications in many fields, the problem of finding the best combination of evolutionary parameters especially for population size that need the manual settings by the user is still unresolved. In this paper, our system is focusing on differential evolution (DE) and its control parameters. To overcome the problem, two new systems were carried out for the self-adaptive population size to test two different methodologies (absolute encoding and relative encoding) in DE and compared their performances against the original DE. Fifty runs are conducted for every 20 well-known benchmark problems to test on every proposed algorithm in this paper to achieve the function optimization without explicit parameter tuning in DE. The empirical testing results showed that DE with self-adaptive population size using relative encoding performed well in terms of the average performance as well as stability compared to absolute encoding version as well as the original DE.