

A time-critical investigation of parameter tuning in differential evolution for non-linear global optimization

Abstract

Parameter searching is one of the most important aspects in getting favorable results in optimization problems. It is even more important if the optimization problems are limited by time constraints. In a limited time constraint problems, it is crucial for any algorithms to get the best results or near-optimum results. In a previous study, Differential Evolution (DE) has been found as one of the best performing algorithms under time constraints. As this has help in answering which algorithm that yields results that are near-optimum under a limited time constraint. Hence to further enhance the performance of DE under time constraint evaluation, a throughout parameter searching for population size, mutation constant and f constant have been carried out. CEC 2015 Global Optimization Competition's 15 scalable test problems are used as test suite for this study. In the previous study the same test suits has been used and the results from DE will be use as the benchmark for this study since it shows the best results among the previous tested algorithms. Eight different populations size are used and they are 10, 30, 50, 100, 150, 200, 300, and 500. Each of these populations size will run with mutation constant of 0.1 until 0.9 and from 0.1 until 0.9. It was found that population size 100, $Cr = 0.9$, $F=0.5$ outperform the benchmark results. It is also observed from the results that good higher Cr around 0.8 and 0.9 with low F around 0.3 to 0.4 yields good results for DE under time constraints evaluation