

## Scientific Programming

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# Dynamically Dimensioned Search Embedded with Piecewise Opposition-Based Learning for Global Optimization

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## Abstract

Dynamically dimensioned search (DDS) is a well-known optimization algorithm in the field of single solution-based heuristic global search algorithms. Its successful application in the calibration of watershed environmental parameters has attracted researcher's extensive attention. The dynamically dimensioned search algorithm is a kind of algorithm that converges to the global optimum under the best condition or the good local optimum in the worst case. In other words, the performance of DDS is easily affected by the optimization conditions. Therefore, this algorithm has also suffered from low robustness and limited scalability. In this work, an improved version of DDS called DDS-POBL is proposed. In the DDS-POBL, two effective methods are applied to improve the performance of the DDS algorithm. Piecewise opposition-based learning is introduced to guide DDS search in the right direction, and the golden section method is used to search for more promising areas. Numerical experiments are performed on a set of 23 classic test functions, and the results represent significant improvements in the optimization performance of DDS-POBL compared to DDS. Several experimental results using different parameter values demonstrate the high solution quality, strong

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