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Contents

Opposition Theory Enabled Intelligent Whale Optimization Algorithm

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Abstract Performance of any optimization technique is dependent on the perfect combination of operators; these operators are used for analyzing the exploration and exploiting capability. In the absentia of this combination, an algorithm inclined toward premature convergence is trapped in local optima and is unable to find the best solution. In this paper, a new variant of whale optimization algorithm (WOA) is introduced which combines the concept of opposition-based learning, crossover operator, and sinusoidal function to accelerate the convergence rate and to avoid the trapping in local optima. This will be called as an opposition theory enabled intelligent whale optimization algorithm (OIWOA). To test the effectiveness of OIWOA, it is evaluated on an array of 23 classical benchmark functions. The performance measures show that the proposed variant possesses a better capability in solving optimization problems.

Keywords WOA · OIWOA · Opposition-based learning · Crossover operator

1 Introduction

Optimization is a method of finding the best solution with the most cost-effective or highest achievable performance under the given constraints from all the feasible solutions available. In the most straightforward condition, an optimization problem consists of maximizing or minimizing a real function by adequately selecting input values from within an allowed set and calculating the value of the function. Optimization is useful in engineering, medical science, mathematics, and other research works. There are different techniques for solving optimization problems, i.e., traditional optimization techniques and modern optimization techniques. The traditional optimization techniques are useful in finding the optimal solution for continuous and

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