

An Improved Sine Cosine Algorithm for Solving Optimization Problems

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Abstract

Due to its simplicity and less tedious parameter tuning over other multi-agent-based optimization algorithms, Sine Cosine Algorithm (SCA) has gained lots of attention from numerous researchers for solving optimization problem. However, the existing SCA tends to have low optimization precision and local minima trapping effect due to the constraint in its exploration and exploitation mechanism. To overcome this drawback, an extensive version of SCA named Improved Sine Cosine Algorithm (iSCA) has been proposed in this work. The main concept is to introduce a nonlinear control strategy to the existing SCA's exploration and exploitation process in order to synthesize the algorithm's strength. The effectiveness of this proposed algorithm is evaluated using 23 classical well-known benchmark functions and the results are then verified by a comparative study with several other algorithms namely Ant Lion Optimizer (ALO), Multi-verse Optimization (MVO), Spiral Dynamic Optimization Algorithm (SDA) and Sine Cosine Algorithm (SCA). Experimental results show that the iSCA is very competitive compared to the state-of-the-art meta-heuristic algorithms.

Keywords— Optimization, Meta-heuristic Algorithm, Physics-based optimization, Sine Cosine Algorithm (SCA), Improved Sine Cosine Algorithm (iSCA).