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Chaotic Whale Optimization Algorithm

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Abstract

The Whale Optimization Algorithm (WOA) is a recently developedmeta-heuristic optimization algorithm which is based on the hunting mechanism of humpback whales. Similarly to other meta-heuristic algorithms, the main problem faced by WOA is slow convergence speed.So to enhance the global convergence speed and to get better performance, this paper introduces chaos theory into WOA optimization process. Various chaotic maps are considered in the proposed chaotic WOA (CWOA) methods for tuning the main parameter of WOA which helps in controlling exploration and exploitation. The proposed CWOA methods are benchmarked on twenty well-known test functions. The results prove that the chaotic maps (especially Tent map) are able to improve the performance of WOA.

Keywords: Whale Optimization Algorithm,Meta-heuristic algorithm,Chaos, Chaotic maps.

1. Introduction

In many optimization problems, it is required to find the optimal solution to agiven problem under highly complex constraints in a reasonable amount of time.Generally, modern intelligent methods are used to deal with these types of optimization problems.There are various methods that are proposed in order to solve these problems but they are insufficient to produce better results. In the past few decades, meta-heuristic optimization algorithms have achieved a lot of attention in scientific communities with significant developments, especially for solving many complex optimization problems.Prior to meta-heuristic algorithms, Hill-Climbing, Random