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Extended Bat Algorithm (EBA) as an Improved Searching Optimization Algorithm

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Abstract. This paper presents a new searching technique by using a new variant of Bat Algorithm (BA) known as Extended Bat Algorithm (EBA). EBA introduces the spiral searching method instead of randomly searching used in original BA. Spiral searching method taken from Spiral Dynamic Algorithm (SDA) is performed to improve the accuracy and efficiency of the original algorithm such as stabilizing the convergence when reaching ideal value. EBA conserves the robustness of BA and SDA and increases the performance of the proposed algorithm. The proposed algorithm is tested by using numerical experiments with three different objective functions. The results show that EBA outperforms original Bat Algorithm (BA) and Particle Swarm Optimization (PSO) in almost test functions and successfully optimizes the numerical problems.

Keywords: Extended Bat Algorithm, Spiral Searching Method, Engineering Optimization.

1 Introduction

Metaheuristic optimization algorithms have acquired more interest from a lot of researchers globally. These algorithms are inspired by biological phenomena or natural phenomena. For example, focused spiral phenomena are approximated to logarithmic spirals which frequently appear in nature, such as whirling current, a low pressure, a nautilus shell, arms of spiral galaxies and so on [1].

This paper proposed a new variant of Bat Algorithm (BA) [2] that uses the search method from Spiral Dynamic Algorithm (SDA) [1, 3]. Motivation of these algorithms came from the searching method of most metaheuristic algorithms such as Bat Algorithm (BA) and Particle Swarm Optimization (PSO) which are spreading the particles randomly in search space. It is expected that by adding the spiral searching technique, it makes the algorithm becomes more accurate and efficient.