

A New Bio-inspired Algorithm: Chicken Swarm Optimization

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Abstract. A new bio-inspired algorithm, Chicken Swarm Optimization (CSO), is proposed for optimization applications. Mimicking the hierarchal order in the chicken swarm and the behaviors of the chicken swarm, including roosters, hens and chicks, CSO can efficiently extract the chickens' swarm intelligence to optimize problems. Experiments on twelve benchmark problems and a speed reducer design were conducted to compare the performance of CSO with that of other algorithms. The results show that CSO can achieve good optimization results in terms of both optimization accuracy and robustness. Future researches about CSO are finally suggested.

Keywords: Hierarchal order, Chickens' behaviors, Swarm intelligence, Chicken Swarm Optimization, Optimization applications.

1 Introduction

Bio-inspired meta-heuristic algorithms have shown proficiency of solving a great many optimization applications [1, 2]. They exploit the tolerance for imprecision and uncertainty of the optimization problems and can achieve acceptable solutions using low computing cost. Thus the meta-heuristic algorithms, like Particle Swarm Optimization (PSO) [3], Differential Evolution (DE) [2], Bat Algorithm (BA) [1], have attracted great research interest for dealing with optimization applications.

New algorithms are still emerging, including krill herd algorithm [4], and social spider optimization [5] et al. All these algorithms extract the swarm intelligence from the laws of biological systems in nature. However, to learn from the nature for developing a better algorithm is still in progress.

In this paper, a new bio-inspired optimization algorithm, namely Chicken Swarm Optimization (CSO) is proposed. It mimics the hierarchal order in the chicken swarm and the behaviors of the chicken swarm. The chicken swarm can be divided into several groups, each of which consists of one rooster and many hens and chicks. Different chickens follow different laws of motions. There exist competitions between different chickens under specific hierarchal order.