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Performance Comparison of Some Two-Dimensional Chaotic Maps for Global Optimization

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Abstract: This paper studied the performance of a new class of evolutionary algorithms called the chaos optimization algorithms (COA). It was originally proposed to solve nonlinear optimization problems with bounded variables by Caponetto et al. [1, 2]. Different chaotic mappings have been considered, combined with several working strategies. We propose four different 2-D chaotic maps in the optimization algorithm using a two-stage chaos optimization method and compare them. This study surveys and compares the chaotic optimization algorithms in the literature. Furthermore, a two-phase strategy is a technique commonly used in the COA to fine tune the solution and help escaping from local optimums. The performance study is conducted to understand their impact on the chaos optimization algorithm.

Keywords: *chaos; global optimization; chaotic map; chaos optimization algorithm.*

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1 Introduction

The existence of chaotic systems is an accepted fact of science [3]. Chaos is a kind of characteristics of nonlinear systems and chaos theory studies the behavior of systems that follow deterministic laws but appear random and unpredictable. This theory brings many qualitative and quantitative tools, namely, ergodicity, entropy, expansivity, and sensitive dependence on initial conditions. Theory of chaos, since its evolution, has found application in various important areas such as engineering, medicine, biology, economy and many others. The application of the Chaotic Search strategy in engineering had its peak of popularity over the last few years [3–8]. This approach configured as an

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