



A comprehensive survey on the sine–cosine optimization algorithm

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Abstract

Metaheuristic algorithms based on intelligent rules have been successfully developed and applied to solve many optimization areas over the past few decades. The sine–cosine algorithm (SCA) imitates the behaviour of transcendental functions while the sine and cosine functions are presented to explore and exploit the search space. SCA starts by random population and executes iterative evolution processes to update the standard evolutionary algorithm's destination or the best location. SCA used linear transition rules to balance the exploration and exploitation searches while searching for the best or optimal solutions. Since Mirjalili proposed it in 2016, SCA has attracted many researchers' attention to deal with several optimization problems in many fields due to its strengths in solving optimization tasks that include the simple concept, easiness of implementation, and rapid convergence. This paper aims to provide researchers with a relatively comprehensive and extensive overview of the Sine–Cosine optimization algorithm in the literature to inspire further research. It examines the available publications, including improvements, binary, chaotic, hybridizations, multi-objective variants, and different applications. Some optimization formulations regarding single-objective optimization problems, multi-objective optimization problems, binary-objective optimization problems, and more classifications regarding the optimization types are discussed. An extensive bibliography is also included.

Keywords Metaheuristics optimization · Sine–cosine algorithm · Modifications · Hybridization · Applications

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