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Cuckoo search with composite flight operator for numerical optimization problems and its

application in tunnelling

Hossein Abedi Firouzjaee[a], Javidan Kazemi Kordestani[b*] & Mohammad Reza Meybodi[a]
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Abstract

This article presents two modifications of the cuckoo search (CS) algorithm for numerical optimization problems. The first modified algorithm is cuckoo search with composite flight (CSCF), which is aimed at improving the performance of the CS by introducing a novel composite flight operator in the standard CS. The main idea of the composite flight operator is to allow a new cuckoo egg to be generated by taking different random walks. The second modified algorithm is aimed at improving the technique used by CSCF by adaptively choosing the flight operator at each time step via the learning automata. Moreover, a model based on support vector regression and CSCF, in which CSCF is used to adjust the parameters of support vector regression (*i.e.* C and γ), is developed to estimate the penetration rate of a tunnel-boring machine. The experimental results show that the proposed modifications can significantly improve the performance of the standard CS.

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