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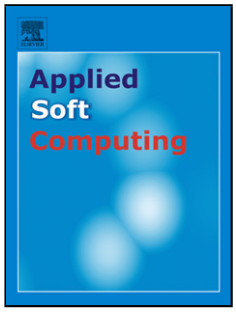

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An Efficient Hybrid Clustering Method based on Improved Cuckoo Optimization and Modified Particle Swarm Optimization Algorithms

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Highlights

- A hybrid method for data clustering is proposed.
- It is based on improved cuckoo optimization and modified particle swarm Optimization Algorithms.
- Experimental results and statistical analysis using several datasets confirm its potential and applicability.

Abstract

Partitional data clustering with K-means algorithm is the dividing of objects into smaller and disjoint groups that has the most similarity with objects in a group and most dissimilarity from the objects of other groups. Several techniques have been proposed to avoid the major limitations of K-Means such as sensitive to initialization and easily convergence to local optima. An alternative to solve the drawback of the sensitive to centroids' initialization in K-Means is the K-Harmonic Means (KHM) clustering algorithm. However, KHM is sensitive to the noise and easily runs into local optima. Over the past decade, many algorithms are developed for solving this problems based on evolutionary method. However, each algorithm has its own advantages, limitations and shortcomings. In this paper, we combined K-Harmonic Means (KHM) clustering algorithm with an improved Cuckoo Search (ICS) and particle swarm optimization (PSO). ICS is intended to global optimum solution using Lévy flight method through changing radius in a dynamic and shrewd manner. Therefore, it is faster than standard cuckoo search. ICS is effected with PSO to avoid falling into local optima. The proposed algorithm, called ICMPKHM, solves the local optima problem of KHM with significant improvement on efficacy and stability. Experiments with benchmark datasets show that the proposed algorithm is quite insensitive to the centroids' initialization. Comparative studies with other algorithms reveal that the proposed algorithm produce high quality and stable clustering results.