

## Multimodal Optimization of Density-Based Clustering Using Collective Animal Behavior Algorithm

**Authors :** Kristian Bautista, Ruben A. Idoy

**Abstract :** A bio-inspired metaheuristic algorithm inspired by the theory of collective animal behavior (CAB) was integrated to density-based clustering modeled as multimodal optimization problem. The algorithm was tested on synthetic, Iris, Glass, Pima and Thyroid data sets in order to measure its effectiveness relative to CDE-based Clustering algorithm. Upon preliminary testing, it was found out that one of the parameter settings used was ineffective in performing clustering when applied to the algorithm prompting the researcher to do an investigation. It was revealed that fine tuning distance  $\delta_3$  that determines the extent to which a given data point will be clustered helped improve the quality of cluster output. Even though the modification of distance  $\delta_3$  significantly improved the solution quality and cluster output of the algorithm, results suggest that there is no difference between the population mean of the solutions obtained using the original and modified parameter setting for all data sets. This implies that using either the original or modified parameter setting will not have any effect towards obtaining the best global and local animal positions. Results also suggest that CDE-based clustering algorithm is better than CAB-density clustering algorithm for all data sets. Nevertheless, CAB-density clustering algorithm is still a good clustering algorithm because it has correctly identified the number of classes of some data sets more frequently in a thirty trial run with a much smaller standard deviation, a potential in clustering high dimensional data sets. Thus, the researcher recommends further investigation in the post-processing stage of the algorithm.

**Keywords :** clustering, metaheuristics, collective animal behavior algorithm, density-based clustering, multimodal optimization

**Conference Title :** ICDMKD 2018 : International Conference on Data Mining and Knowledge Discovery

**Conference Location :** Osaka, Japan

**Conference Dates :** September 13-14, 2018