

An improved adaptive memetic differential evolution optimization algorithms for data clustering problems

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The performance of data clustering algorithms is mainly dependent on their ability to balance between the exploration and exploitation of the search process. Although some data clustering algorithms have achieved reasonable quality solutions for some datasets, their performance across real-life datasets could be improved. This paper proposes an adaptive memetic differential evolution optimisation algorithm (AMADE) for addressing data clustering problems. The memetic algorithm (MA) employs an adaptive differential evolution (DE) mutation strategy, which can offer superior mutation performance across many combinatorial and continuous problem domains. By hybridising an adaptive DE mutation operator with the MA, we propose that it can lead to faster convergence and better balance the exploration and exploitation of the search. We would also expect that the performance of AMADE to be better than MA and DE if executed separately. Our experimental results, based on several real-life benchmark datasets, shows that AMADE outperformed other compared clustering algorithms when compared using statistical analysis. We conclude that the hybridisation of MA and the adaptive DE is a suitable approach for addressing data clustering problems and can improve the balance between global exploration and local exploitation of the optimisation algorithm.

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