

# **Abstract**

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## **Design of Novel Metaheuristic Techniques for Clustering**

One of the major drawbacks of clustering techniques utilizing a predetermined number of clusters is that it does not guarantee convergence to the global optimum. Evolutionary algorithms are one of the most powerful general search techniques that can guarantee, if well designed, to converge to the global optimum. In this paper, a novel metaheuristic framework capable of identifying the optimum number of clusters will be proposed. In the proposed framework, an edge-recombination crossover operator, along with a redesigned chromosome architecture, is implemented to help in obtaining the optimum number of clusters. A genetic algorithm (GA)-based technique, an artificial immune system centralized on clonal Selection algorithm, and immuno-GA will be designed and implemented. The proposed techniques will be tested on different real-world data sets with various sizes and dimensions. The obtained results are then used in a comparative study between all the proposed techniques to determine and Select the best solution. Further investigation for the effectiveness of the results and the verification of the statistical validity for the number of clusters is carried out using Mann–Whitney–Wilcoxon rank-sum test.