

An Experimental Study on Some Conventional and Hybrid Models of Fuzzy Clustering

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Abstract : Clustering is a versatile instrument in the analysis of collections of data providing insights of the underlying structures of the dataset and enhancing the modeling capabilities. The fuzzy approach to the clustering problem increases the flexibility involving the concept of partial memberships (some value in the continuous interval $[0, 1]$) of the instances in the clusters. Several fuzzy clustering algorithms have been devised like FCM, Gustafson-Kessel, Gath-Geva, kernel-based FCM, PCM etc. Each of these algorithms has its own advantages and drawbacks, so none of these algorithms would be able to perform superiorly in all datasets. In this paper we will experimentally compare FCM, GK, GG algorithm and a hybrid two-stage fuzzy clustering model combining the FCM and Gath-Geva algorithms. Firstly we will theoretically dis-cuss the advantages and drawbacks for each of these algorithms and we will describe the hybrid clustering model exploiting the advantages and diminishing the drawbacks of each algorithm. Secondly we will experimentally compare the accuracy of the hybrid model by applying it on several benchmark and synthetic datasets.

Keywords : fuzzy clustering, fuzzy c-means algorithm (FCM), Gustafson-Kessel algorithm, hybrid clustering model

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