SYNNC: SYMMETRIC KERNEL NEURAL NETWORK FOR DATA CLUSTERING

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Abstract

Clustering is a form of unsupervised learning which can partition data into subsets based upon input attributes and distance metrics such as Euclidean. Clustering is useful for discovering groups and identifying interesting distributions in the underlying data. Traditional clustering algorithms either favor clusters with spherical shapes and similar sizes or do not efficiently solve the cases with overlapping clusters.

This paper introduces a new strategy to clustering based on shape-adaptive potential functions and optimization procedure for positioning of the cluster centers during the learning process. The two fundamental components of SYNNC are potential function generators (PFGs) using symmetrical kernels and potential function entities (PFEs) which perform the nonlinear transformation of the input data and create the clusters boundaries. The proposed clustering NN was tested with 2D-generated data sets as well as with benchmark data sets. It showed much better results in cases of “difficult” and overlapping clusters than those received by some existing clustering algorithms.