Morphological Boundary Detection for Cluster Analysis and HEP Data Classification

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Abstract: Cluster analysis consists in partitioning a collection of data points into a number of groups, where the objects, inside a cluster, show a relatively high degree of closeness. Many statistical clustering approaches have been developed based on fundamental assumption that the patterns are drown from a multidimensional probability density function p.d.f., each mode of this function corresponding to a cluster.

The proposed paper gives a new mode boundary approach for cluster analysis, based on mathematical concepts. It consists of a fast Parzen estimation of the underlying p.d.f. and a smoothing using numerical morphological transformation. The performance of this approach, by the corresponding classification rule, is demonstrated on a model example using generated LHC events.