

## SPATIAL HIERARCHICAL CLUSTERING

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- **ABSTRACT:** *This paper studies a methodology for hierarchical spatial clustering of contiguous polygons, based on a geographic coordinate system. The studied algorithm is built upon a modification of traditional hierarchical clustering algorithms, commonly used in the multivariate analysis literature. According to the method studied in this paper, at each step of the sequential process of collapsing clusters, only neighboring clusters (groups of original polygons, i.e. municipalities, census tracts, states) are allowed to be collapsed to form a bigger cluster. Two types of neighborhood are used: polygons with one edge in common (rook neighborhood) or polygons with at least one point in common (queen neighborhood). In this paper, the methodology is employed to create clusters of Brazilian municipalities, for the year 2000, based on a group of socio-economic variables. Several clustering methods are investigated, as well as several types of vector distances. The studied methods were: centroid method, single linkage, complete linkage, average linkage, average linkage weighted, Ward minimum variance and median method. The studied distances were:  $L_p$  norm (particularly,  $L_1$  and  $L_2$  norms), Mahalanobis distance and variance corrected Euclidian distance. Finally, a discussion on selection of the number of clusters is presented.*
- **KEYWORDS:** *Cluster analysis, regionalization methods, hierarchical algorithms.*

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