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A Non-parametric Clustering Approach for Multivariate Geostatistical Data

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Abstract : Multivariate geostatistical data have become omnipresent in the geosciences and pose substantial analysis challenges. One of them is the grouping of data locations into spatially contiguous clusters so that data locations within the same cluster are more similar while clusters are different from each other, in some sense. Spatially contiguous clusters can significantly improve the interpretation that turns the resulting clusters into meaningful geographical subregions. In this paper, we develop an agglomerative hierarchical clustering approach that takes into account the spatial dependency between observations. It relies on a dissimilarity matrix built from a non-parametric kernel estimator of the spatial dependence structure of data. It integrates existing methods to find the optimal cluster number and to evaluate the contribution of variables to the clustering. The capability of the proposed approach to provide spatially compact, connected and meaningful clusters is assessed using bivariate synthetic dataset and multivariate geochemical dataset. The proposed clustering method gives satisfactory results compared to other similar geostatistical clustering methods.

Keywords : clustering, geostatistics, multivariate data, non-parametric
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