

## **Dynamic fuzzy clustering of areal units**

Coppi, R., D'Urso, P., Giordani, P.

**keywords:** fuzzy clustering; fuzzy *C*-means; tuning coefficient

Clustering of space-time series should consider: 1) the spatial nature of the objects to be clustered; 2) the characteristics of the feature space, namely the space of multivariate time trajectories; 3) the uncertainty associated with the assignment of a spatial unit to a given cluster on the basis of the above complex features. The last aspect is dealt with by using the Fuzzy *C*-Means objective function, based on appropriate measures of dissimilarity between time trajectories. In order to take into account the spatial nature of the statistical units, a spatial penalization term is added to the above function, depending on a suitable spatial proximity matrix. A tuning coefficient takes care of the balance between, on one side, discriminating according to the pattern of the time trajectories and, on the other side, ensuring an approximate spatial homogeneity of the clusters. A technique for determining an optimal value of this coefficient is proposed, based on a spatial autocorrelation function. An application of the present method to a real data set is carried out.