Exploratory Geovisualization of Spatial Dynamics

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BIOGRAPHY

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ABSTRACT

This paper introduces two classes of new graphical methods for the exploratory analysis of geographical patterns and space-time dynamics. The first is based on recent developments in relative distribution theory which we extend to include geographical constructs. Currently, relative distribution methods can decompose an underlying empirical distribution to identify the temporal changes in locational and shape characteristics. We construct a series of geographical conditioning schemes which anatomize the relative distribution by degrees of spatial interaction. The resulting extension identifies space-time dynamics in the evolution of empirical distributions. The second set of methods draws on computational geometry to characterize spatial, and space-time clustering. Here we introduce nested convex hulls and ordinal spatial windows as new approaches towards detection of spatial clustering. Measures derived from these spatial objects provide useful complements to

existing global and local measures of spatial association, and consider their extension to space-time cluster detection as well as multivariate spatial analysis. Both sets of measures are implemented as part of the open source package STARS: Space Time Analysis of Regional System. This implementation employs dynamically linked spatial and statistical graphics which supports interactive visualization of these new methods. We illustrate the use of these new measures by applying STARS in a case study of spatial income inequality dynamics in the United States.