New software helps reveal patterns in space and time

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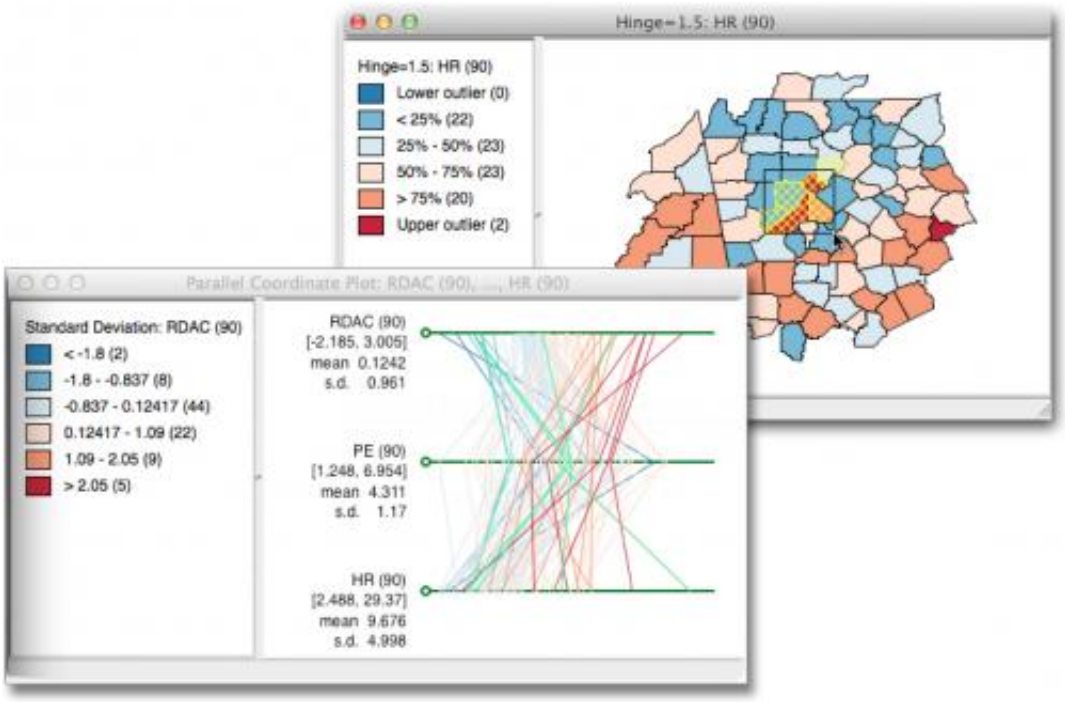

These two OpenGeoDa views allow exploration of a region's homicide patterns in both geographic and statistical space. The map (above) represents homicide rates for a cluster of counties, with high rates in red and low rates in blue. The parallel coordinate plot (below) allows for a visual and statistical assessment of how the counties' homicide rates (HR) relate to its police expenditures (PE) and resource deprivation (RDAC). Linking of the map with the graph allows the OpenGeoDa user to select a few counties (yellow) and see their values for all three variables on the plot (green). Changing the selection on the map will trigger a new selection on the plot, and vice versa, allowing for a comparison of subregions with the region as a whole. Credit: Luc Anselin, ASU

The GeoDa Center for Geographical Analysis & Computation, led by ASU Regents' Professor Luc Anselin, has just released a new version of its signature software, OpenGeoDa. The software provides a user-friendly interface to implement techniques for exploratory spatial data analysis and spatial modeling. It has been used to better understand issues ranging from health care access to economic development to crime clusters. It is freely downloadable and open-source.

The software is used internationally, with more than 75,000 unique downloads, and lab installations at universities such as Harvard, MIT and Cornell. The new version, OpenGeoDa 1.2.0, provides the most significant enhancements since the first release in 2003.

A key addition in the new version is space-time analysis – maps and charts that make it possible to track changes in spatial patterns over time. "For example, a series of maps could plot variations in educational achievement by school district, for a series of years," says Anselin. "An individual map would show clusters of high and low achievement; but adding the dimension of time makes it possible to assess the effect of a policy intervention, by comparing both achievement levels and spatial clusters, before and after the intervention."

Another powerful capability is the real-time link between maps, graphs and statistical summaries of the same data set. For example, researchers have used OpenGeoDa to explore the relation between crime and social deprivation, which turns out to hold in urban but not necessarily in rural areas. Using OpenGeoDa, a cluster of high-crime regions can be selected on a map; and data for various socioeconomic aspects of each region will highlight on a graph. Descriptive statistics for the cluster – as distinct from the entire map area – will also appear.

The new version of OpenGeoDa can show how these relationships vary over time, and offers live links between the maps and different chart

types such as scatter plots, histograms, box plots, parallel coordinate plots, 3D plots, conditional maps or plots, and bubble charts. Bubble charts are entirely new to OpenGeoDa and can visualize four variables by varying the size and color of scatterplot points.

OpenGeoDa runs on the National Center for Health Statistics' Research Data Center's servers; allowing researchers to use the software to analyze microdata not available elsewhere.

ASU's GeoDa Center for Geographical Analysis and Geocomputation, directed by Anselin, offers free downloads, documentation and tutorials to support new OpenGeoDa users.

Luc Anselin, who has led development of OpenGeoDa from its origins to the present version, is director of ASU's School of Geographical Sciences & Urban Planning in the College of Liberal Arts and Sciences as well as holding the Walter Isard Chair. Mark McCann is the principal software engineer of OpenGeoDa. The development of GeoDa and related materials has been primarily supported by the U.S. National Science Foundation/ the Center for Spatially Integrated Social Science (CSISS) and more recently by the National Institutes of Health and the National Institute of Justice.

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