Improved Analysis and Visualization of Community Indicators and Indices

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Abstract

The analysis and interpretation of community indicators has been widely conducted to understand community trends, and subsequently, to support program planning, public policy initiatives, and target geographic regions for research. Given the importance of the outcomes, selecting good indicators is key, and usually a balance of stakeholder input and analytical evaluation. The most common analysis method used to evaluate a set of indicators is principal component analysis (PCA), a linear multivariate analysis method. However, the assumptions of PCA may be too restrictive and consequently, the analysis may fail to provide a sound evaluation of the set of indicators. In response to this shortcoming, we paired PCA with an unsupervised, non-linear multivariate method, known as self-organizing maps (SOMs), to analyze a set of indicators focused on population trends in education, income, employment, among others, at both the county level and the census tract level. The joint results were used to: exclude or include indicators from the indicator set, determine the latent primary dimensions of the dataset, identify peer counties and census tracts (relative to Indiana counties / census tracts), identify associations among different indicators at different geographic scales, identify temporal changes in the value of indicators, and develop one or more indices to describe socio-economic conditions of communities. Outcomes are presented geographically, topologically, tabularly, and graphically, offering different mechanisms of understanding and interpreting the analysis results. A goal of this project is to provide a web-based interface for researchers and community stakeholders to identify and evaluate candidate sets of community indicators, potentially accelerating sound public policy decisions and public health research.