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Mapping the results of local statistics: Using geographically weighted regression

BY Stephen Matthews, Tse-Chuan Yang

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Abstract

Background: The application of geographically weighted regression (GWR) - a local spatial statistical technique used to test for spatial nonstationarity - has grown rapidly in the social, health, and demographic sciences. GWR is a useful exploratory analytical tool that generates a set of location-specific parameter estimates which can be mapped and analysed to provide information on spatial nonstationarity in the relationships between predictors and the outcome variable.

Objective: A major challenge to users of GWR methods is how best to present and synthesize the large number of mappable results, specifically the local parameter parameter estimates and local t-values, generated from local GWR models. We offer an elegant solution.

Methods: This paper introduces a mapping technique to simultaneously display local parameter estimates and local t-values on one map based on the use of data selection and transparency techniques. We integrate GWR software and GIS software package (ArcGIS) and adapt earlier work in cartography on bivariate mapping. We compare traditional mapping strategies (i.e., side-by-side comparison and isoline overlay maps) with our method using an illustration focusing on US county infant mortality data.

Conclusions: The resultant map design is more elegant than methods used to date. This type of map presentation can facilitate the exploration and interpretation of nonstationarity, focusing map reader attention on the areas of primary interest.

Author's Affiliation

Stephen Matthews - Pennsylvania State University, United States of America [EMAIL]
Tse-Chuan Yang - University at Albany, State University of New York, United States of America [EMAIL]

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