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GEOB 479: Research in GIS
Crime Statistics Article Review

Comparative modeling approaches for understanding urban violence: a review

The primary purpose of the paper is to provide a comparative analysis of three analytical approaches to modeling assault density in an urban setting. Using Ordinary Least Squares (OLS), Geographically Weighted Regression (GWR) and Data Envelopment Analysis (DEA), the authors explore structural theories of violence and factors that influence heterogeneous block-group distributions of crime in Cincinnati, Ohio. To predict assault rates between January and June of 2008, the authors use 2006 population density statistics from Caliper Corporation, density of alcohol outlets from the Ohio Division of Liquor Control, and a social disorganization index calculated from socio-economic disadvantage, female headed-households, and residential instability, as independent variables. The authors investigate the comparative strengths, usefulness, and congruity between the analysis methods in discovering differences in crime generation and underlying demographic and socioeconomic stimuli. This type of research leads to more efficient allocation of police resources to neighbourhoods in need, and more careful evaluation of the spatial, demographic, socioeconomic and institutional factors behind the distinct crime rates in others.

Results of the analyses, along with a cartographic analysis, are clearly communicated and accompanied by informative maps and graphs: the analysis methods are potentially complimentary approaches for exploring factors behind urban violence. Combining these methods should provide analysts a more complete view of the variables and their dynamics in a linear framework. Though the GWR analysis had the lower, more superior AIC score, both OLS and GWR results had similarly high *R*-squared values (.5996 and .696, respectively). The above regression analyses had difficulty predicting some of the same neighbourhoods (ex: Over-the-Rhine), and found the social disorganization index to be the primary factor. The DEA efficiently produced assault statistics in

both low (e.g. California) and high (e.g. Over-the-Rhine) crime areas, but a majority of the block groups were found to be inefficient: there were other significant factors at play.

The authors state the scope of the paper, recognize the limitations and advantages of each analysis method, and emphasize that factors operate differently across neighbourhoods. They provide ample information on the analysis methods, theories behind the spatial dynamics of urban violence (social disorganization, collective efficacy, social cohesion), and thoroughly describe the selected determinants of violence. A multitude of previous studies are cited to reinforce the validity of recognizing the spatial perspective of crime. Readers from a diverse set of backgrounds will greatly benefit from this paper, not just specifically GIS-inclined audiences.

Authors bring up the problem of regression-based statistical techniques' inability to factor unique features of neighborhoods, which they state is essential to understanding spatial heterogeneity of crime. They do offer short theories on why some areas had lower technical efficiency scores, but these are purely hypothetical and require more evidence to contribute to the authors' speculations on inaccuracies of the models. Besides determining the primary factor to be social disorganization, the results generated by OLS and GWR were fairly predictable. The paper is limited by its conclusion: the combination of models offer a more complete view of the variables and their dynamics in a linear framework, and little else is said about why some spatial units deviate from the average result produced by regression analysis. The authors are quite reserved over their research's ability to provide insight into the general usefulness of OLS, GWR and DEA to predict rates of violence.

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