Combining Geographic and Social Proximity to Model Urban Domestic and Sexual Violence

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ABSTRACT

In order to understand the dynamics of crime in urban areas, it is important to investigate the socio-demographic attributes of the communities as well as the interactions between neighborhoods. If there are strong social ties between two neighborhoods, they may be more likely to transfer ideas, customs, and behaviors between them. This implies that not only crime itself but also crime prevention and interventions could be transferred along these social ties. Most studies on crime rate inference use spatial statistical models such as spatially weighted regression to take into account spatial correlation between neighborhoods. However, in order to obtain a more flexible model for how crime may be related across communities, one must take into account social proximity in addition to geographic proximity. In this paper, we develop techniques to combine geographic and social proximity in spatial generalized linear mixed models in order to estimate domestic and sexual violence in Detroit, Michigan and Arlington County, Virginia. The analysis relies on combining data from local and federal data sources such as the Police Data Initiative and American Community Survey. By comparing three types of CAR models, we conclude that adding information on social proximity to spatial models, we create more accurate estimation of crime in communities.

KEYWORDS

crime, spatial GLMM, social proximity, commuting data, police data initiative, American Community Survey, CAR

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