Spatial-temporal Forecast Research of Property Crime under the Driven of Urban Traffic Factors

Author: Li Weihong, Wen Lei, and Chen Yebin
Summary by: McKayla Bishop, University of Arkansas

Summary
Robbery crime is heavily influenced by road accessibility, land use, and urban transport development. However, there is not much temporal research done to forecast the trend of property crime and urban traffic factors correctly. The authors help create temporal data using a neural network model on GIS to forecast the correlation. They found the neural network model to be a reasonable fit to forecast the data limited to a small city in China from 2008 to 2012 of property crime and traffic factors.

Methods
The study areas consisted of 34 villages in South China with 5 police stations and a dense population, covering about 11.21 km^2. In 2008 to 2012, about 60.4% crime offenses in the city (19,055 out of 31,519) occurred within the studied area. Property crime covered about 86.4% out of all crime occurrences. Spearman correlation analysis and spatial autocorrelation analysis were used to create a grid of the data. The Genetic Algorithm and BackProp algorithm (GA-BP) neural network was then used to create a matrix to establish the correlation between property crime and urban traffic factors. The error analysis double checked the accuracy of the forecast model created based on the data.

Results
The spearman correlation analysis revealed that there is a correlation between property crime and urban traffic factors. The spatial autocorrelation analysis revealed that the Moore (Queen) neighborhood had the highest spatial autocorrelation. The quantitative measures of policy on crime by the temporal model forecasted can also be revealed by this study. The authors claim with the relation of policy and crime shown, it can help public security departments with decisions on policy measures, policy effectiveness, and police forces.

Implications
The authors imply that their model falls into risk in local minimum data training, which can lead to low accuracy, non-convergence, or other problems. Fortunately, the GA algorithm can help reduce the number of problems and increase the accuracy of the forecast model. The GA-BP neural network on GIS is rarely applied to forecast data. The data of policy urban traffic factor and crime correlation is not linear; therefore, the precision of forecasting this data cannot meet the requirements for just BP neural network model.

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