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Spatial Autoregressive (SAR) Modelling of Crimes in the State of São Paulo

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The issue of public security is a considerable challenge for the Brazilian society and criminality is a great concern in the most populous state in the country, São Paulo. It is often desirable for public management to model and predict crime patterns considering historical data available and the georeference of each municipality (i.e., latitude and longitude). In this context, the use of geospatial models to explain the relationship between predictors and crimes, considering geolocation, can be of great importance. A possible model is the SAR (spatial autoregressive) model, which takes into account the covariates, as well as the underlying spatial dependence (Kazar and Celik, 2012). In this work, SAR model is used to describe and model the number of crimes in the cities of the state of São Paulo in Brazil, including also the monthly seasonality observed in the data. To create the precise model, we make use of packages in Python and R to organize and visualize the data and develop the modelling using the spatial neighborhood matrix. The lasso method is used to select the most significant covariates, for instance inhabitants per household, public elementary school failure rate, public early years, elementary school dropout rate, and then the SAR model is applied to include the spatial information and enrich the modelling of crimes.

Palavras-chave: Crimes Modelling; Geo-Spatial Modelling; SAR Model; State of São Paulo; Security Data.

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