

Geo-statistical Analysis and Modeling of Residential Fire Risks in Toronto Area to Predict Personal Response and Property Damaged

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Abstract

Fire incidents are still a major risk in residential areas especially large cities. Understanding the spatial patterns of fire risks and factors that contribute to their impacts could improve fire response and therefore reduce human injuries, fatalities and property losses. This is even more important and critical in large urban areas such as Toronto where density of population and activities are very high.

This study aims to develop models that can predict require personal response to control the incident and potential of property damage for residential building in Toronto when fire incidents occur. The results of such models would improve fire response management systems.

More than 9,200 fire incidents of residential building in Toronto for the period of 2001 and 2006 provided by Ontario Office of Fire Marshall have been geocoded and used in this study.

Several spatial autoregressive models using various dependent and independent variables for fire risks (e.g. personal response, and estimated damage) and predictors (e.g. distance to fire stations, responding personnel, type of building, ...) have been applied and the results show that spatial autoregressive models are able to better predict fire risks in Toronto.