INVESTIGATION OF ROADWAY GEOMETRIC AND TRAFFIC FLOW FACTORS FOR VEHICLE CRASHES USING SPATIOTEMPORAL INTERACTION

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ABSTRACT:

Traffic safety is a major concern in the transportation industry due to immense monetary and emotional burden caused by crashes of various severity levels, especially the injury and fatality ones. To reduce such crashes on all public roads, the safety management processes are commonly implemented which include network screening, problem diagnosis, countermeasure identification, and project prioritization. The selection of countermeasures for potential mitigation of crashes is governed by the influential factors which impact roadway crashes. Crash prediction model is the tool widely adopted by safety practitioners or researchers to link various influential factors to crash occurrences. Many different approaches have been used in the past studies to develop better fitting models which also exhibit prediction accuracy. In this study, a crash prediction model is developed to investigate the vehicular crashes occurring at roadway segments. The spatial and temporal nature of crash data is exploited to form a spatiotemporal model which accounts for the different types of heterogeneities among crash data and geometric or traffic flow variables. This study utilizes the Poisson lognormal model with random effects, which can accommodate the yearly variations in explanatory variables and the spatial correlations among segments. The dependency of different factors linked with roadway geometric, traffic flow, and road surface type on vehicular crashes occurring at segments was established as the width of lanes, posted speed limit, nature of pavement, and AADT were found to be correlated with vehicle crashes.

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