Public Abstract
First Name:Azad
Middle Name:Salim
Last Name:Abdulhafedh
Adviser's First Name:Timothy
Adviser's Last Name:Matisziw
Co-Adviser's First Name:
Co-Adviser's Last Name:
Graduation Term:FS 2016
Department:Civil Engineering
Degree:PhD
Title:Crash Severity Modeling in Transportation Systems

Road traffic crashes kill about 1.25 million people world-wide every year and injure some 50 million. In order to improve road safety, it is very important to identify risk factors that may provide insight on the mechanism and behavior of the crash severity occurrence and assist in adopting suitable countermeasures. Varieties of statistical models have been applied to establish the relationship between crash severity and potential risk factors. Many traditionally used methods are limited in that they assume that all observations are independent of each other. However, given the reality of vehicle movement in networked systems, the assumption of independence of crash incidence is not likely valid. For instance, spatial and temporal autocorrelations are important sources of dependency among observations that may produce incorrect estimates if not considered in the modeling process. Besides, the roadway sight distance that is available to a driver at a given time can impact their ability to react to changing traffic conditions. To address these limitations, this dissertation first details a framework for detecting temporal and spatial autocorrelation in crash data. An approach for evaluating the sight distance available to drivers along roadways is then proposed. Finally, a crash severity model is developed based upon a multinomial logistic regression approach that incorporates the available sight distance and spatial autocorrelation as potential risk factors, in addition to a wide range of other factors related to road geometry, traffic volume, driver's behavior, environment, and vehicles. To demonstrate the characteristics of the proposed model, an analysis of vehicular crashes (years 2013-2015) along I-70 corridor and Boone County roads in the state of Missouri is conducted. The results of the analysis provide firm evidence on the importance of accounting for spatial and temporal autocorrelation, and the sight distance in modeling traffic crash data.