

Macrocategoria: Geometria e Sicurezza.

Titolo articolo: A Bayesian bivariate hierarchical model with correlated parameters for the analysis of road crashes in Italian tunnels.

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Abstract: An analysis of crashes occurring in 252 unidirectional Italian motorway tunnels over a 4-year monitoring period is provided to identify the main causes of crashes in tunnels. In this paper, we propose a full Bayesian bivariate Poisson lognormal hierarchical model with correlated parameters for the joint analysis of crashes of two levels of severity, namely severe (including fatality and injury accidents only) and non-severe (property damage only), providing better insight on the available data with respect to an analysis based on severe and non-severe independent univariate models. In particular, the proposed model shows that for both of severity levels the crash frequency increases with some parameters: the average annual daily traffic per lane, the tunnel length, and the percentage of trucks, while the presence of the sidewalk provides a reduction in severe accidents. Also the presence of the third lane induces a reduction in severe accidents. Moreover, a reduction in the crash frequency of the two crash-types over years is present. The correlation between the parameters might offer additional insights into how some combinations can affect safety in tunnels. The results are critically discussed by highlighting strength and weakness of the proposed methodology.

Keywords: Bayesian hierarchical model; Bivariate model; Poisson lognormal model; Correlated parameters; MCMC; Road tunnels crashes.

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