

Methodology for traffic risks identification

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Evaluating the performance of motorway traffic risk indicators using simulation and field data

Abstract

Of all modes of transport, transport by road is the most dangerous and the most costly in terms of human lives, according to Road Safety Action Program (2003-2010). In Europe, the 2010 road safety target of halving the number of road fatalities by 2010 seems difficult to be obtained although road safety has been improved recently. Focusing on crash prevention on motorways, this paper proposes a framework for identifying risky traffic conditions using logistic regression models for specific traffic conditions. The innovative feature of this framework is that we evaluate the traffic risk under traffic regimes obtained by Self-Organizing Maps (SOM). We aggregate traffic data from double loop detectors and weather data from weather stations to produce traffic status for 5-minute intervals that we call traffic situations. Using Principal Component Analysis (PCA), we transform the traffic situations into new data space ready for the clustering process by SOM. The PCA transformation allows reducing the number of dimensions and removing random noise in the data. The clustering process by SOM results in groups of similar traffic situations that we call traffic regimes. From crash database, we determine pre-crash traffic situations, which precede crash occurrences. With the obtained clustering results, we classify pre-crash situations into traffic regimes. Under each traffic regime, we develop a logistic regression model for identifying risky traffic situations, which is specific for that traffic regime. The promising result shows that the models can identify correctly high percentage of risky situations while the rate of false detection is low.

Keywords

Motorway traffic safety – traffic regime – traffic situation, crash.