Abstract:

Road crashes are one of the critical issues in the road transportation. The crash studies are done to estimate the likelihood of a crash on a road section, whereas crash impact has received relatively less attention. The focus of the most studies is to establish relationship of crashes with the factors mainly traffic effects. The analysis of microscopic factors such as individual driving intention/maneuver has not received that attention due to requirement of a large disaggregate data. Identification and prediction of driving intention is fundamental for avoiding collisions as it can provide useful information to drivers and vehicles in their vicinity. This study utilizes a large real traffic dataset Highway Drone Dataset (HighD Dataset), collected on German Freeways. A driving intention prediction model using clustering for automatic labelling and supervised deep learning for real time prediction is introduced and validated. The model is able to predict the lane change intention on an average 3 seconds before the vehicle crosses the lane. This study introduces a new Surrogate Safety Measures (SSM) to estimate rear-end crash severity and uses it along with likelihood indicator - Modified Time to Collision (MTTC), to determine the
total crash risk. This study analyzes the effects of traffic conditions and driving intention on the
estimated crash risk. The results of the study indicate that the traffic congestion plays a significant
role in increasing the likelihood and severity of the rear-end crashes. As far as driving intention is
concerned, lane changing is found to be associated with increase in likelihood and severity of a
rear-end crash during free-flow conditions. This study is an attempt to develop a comprehensive
risk estimation method and analyze its dependence on macroscopic and microscopic factors of the
crash. The utilization of large unlabeled and disaggregate data increases the prospects of
transferability of the approach and its practical application for highway safety by researchers and
practitioners.

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