

Risk estimation of critical and non-critical interactions between right-turning motorists and crossing cyclists by a Decision tree

Hagen Saul, Marek Junghans, Mandy Dotzauer and Kay Gimm

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One of the most critical situations in urban areas is when motorists turn right and cyclists cross the road. Many of those crashes result in severe consequences for the cyclists. In order to increase the safety of cyclists, especially in the case of conflicts with right-turning vehicles, we propose an online infrastructure-based assistance system warning drivers and cyclists when a conflict or crash is predicted. By means of automated video traffic detection, the resulting trajectories of road users are analysed and a warning is sent to vehicles and cyclists equipped with vehicle-to-anything communication (V2X), if a high risk is estimated. An approach for online risk estimation is developed combining the surrogate safety measure gap time (GT) with trajectory prediction-based estimates of the time-to-arrival (TTA) or distance to conflict point (DCp) and velocity. A decision tree as classifier of risk levels based on the previous named risk features is trained to model the risks perceived by humans: risk estimations by observing traffic conflict scenes are used to build a first model, apply the model, and improve it in the field. The warning system was evaluated by test drives in real traffic at AIM Research Intersection in Braunschweig, Germany. The system was subjectively assessed by cyclists and vehicles drivers. In 2/3 of the 52 runs, it was assessed as helpful with a timely warning signal.