

TOP TEN

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Category: Road

Country: Netherlands

Research Area 1: Smart Solutions and Society

Idea Number: 79

Privacy-preserving, Trajectory-based Intersection Safety Assessment

Traffic crosses, converges, and diverges at intersections: these elements of the road network entail considerable risk of conflicts and potential collisions. Assessing and improving the safety of intersections is therefore a constant need. For fine-grained infrastructure design and traffic management, the assessment and improvement are required to be at specific locations. To this end, deriving a "safety map" for intersections from real-world data is essential. However, such location-specific assessment endangers the privacy of road users: vehicles would be continuously tracked in current trajectory-based methods, which are vulnerable to malicious privacy attacks. To address the concern, this project proposes a privacy-preserving framework for intersection safety assessment. The framework prevents personal identification and tracking by using minimum segments of vehicle trajectories. These trajectory segments are further randomised and anonymised, with only the conflict relations between vehicles preserved. Based on the conflict relations, the framework quantifies the real-time spatial distribution of conflict risk at intersections. The major contributions of this project can be summarized as follows: i) assessment of real-time spatial distribution of potential conflicts at intersections from real-world traffic; ii) processing of trajectory data in a privacy-preserving manner that prevents personal identification and tracking; iii) enhancement of management insights and feasible plans to improve the safety level at intersections. Experiments on an offline dataset show the reasonableness and effectiveness of this framework. It is expected that this project can contribute to safer design and management of intersections, thus improving the road network safety.

