Impact of crowdsourced speed check data on traffic speed: A case study of the Netherlands

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These days most people use navigation apps such as Google Maps, Waze, and Flitsmeister to find the best route for their trip due to the proliferation of smartphones and internet connectivity. These apps use the users' GPS data known as crowdsourced data to estimate and provide real-time travel information. Recently, these apps also enable a feature where users can provide feedback and share their experiences. This information not only can help these apps to predict future travel times more accurately but also can warn other app users about the conditions and help travellers to adjust their routes or driving behaviours accordingly, making everyone a more careful driver.

The 3Es approach, which comprises of engineering, education, and enforcement, have been used for decades to improve road safety. Traffic safety can increase through educating people about traffic safety and driving skills, as well as improving road infrastructure and vehicle standards. In addition, traffic enforcement can modify the behaviour of high-risk drivers and is still an integral part of safety improvement. However, the report of police activity on navigation apps may nullify the impact of enforcement. Therefore, the goal of this research is to examine whether travellers adjust their speed due to police activity reports in navigation apps. Traffic speed is one of the three imperative traffic parameters, which could reflect traffic state and has become the key component of traffic prediction research. Forecasting traffic speed is of great significance for road users and urban managers, which could help to reasonably plan travel routes and manage urban traffic. Urban traffic speed prediction has always been one of the most challenging parts of intelligent transportation systems (ITS) due to the complicated spatial and temporal correlations of urban road networks. Many predictive models have been proposed to capture the spatio-temporal dependence of traffic data and their effectiveness have been proved using real traffic data. Moreover, to increase the prediction accuracy, the influence of external factors such as social attributes accidents weather and point of interest (POI) have been investigated. However, the research on the impact of external factors on traffic speed is still not comprehensive enough; for instance, the impact of crowdsourced data about police activity on traffic speed has not been investigated yet to the best of our knowledge. Therefore, the goal of this research is to examine whether the report of the police enforcement on navigation apps affect the traffic speed and the accuracy of the prediction models.

This research will extract police enforcement information from crowdsourced data from navigation apps in the Netherlands, collect historical traffic speed data on the same road segments where enforcement happened, and predict the speed based on a deep learning prediction model. Then analyze the results to examine the impact of police speed checks reported in navigation apps on drivers' behaviours, as well as the accuracy of deep learning predictive models in the presence of police enforcement.