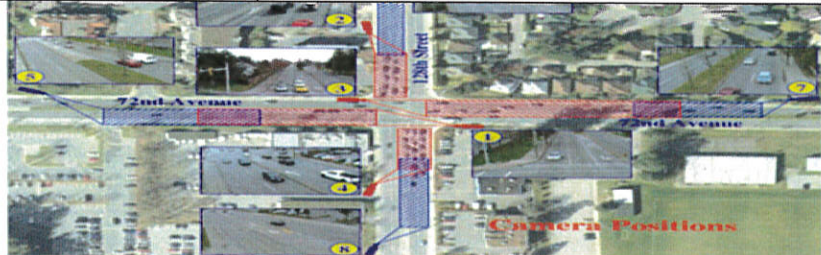


Investigation of the surrogate safety validation practices

Bachelor's Thesis of Minh Vo

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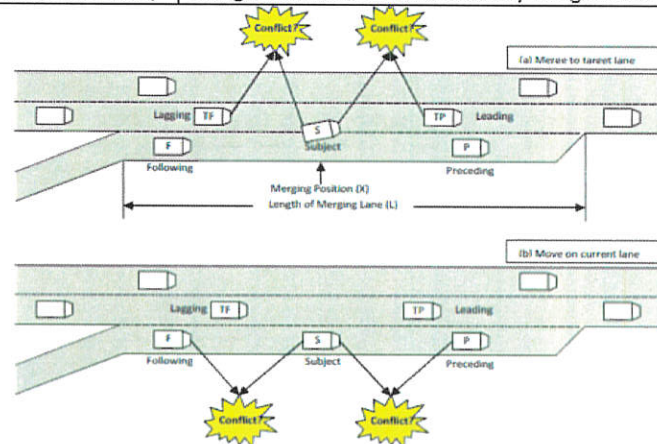
(El-Basyouny and Sayed 2013)	Safety performance using traffic conflicts
(Essa and Sayed 2015)	Transferability of calibrated micro simulation model parameters
(Zhou and Huang 2013)	Development of traffic safety method at signalized intersections
(Oh, Kim et al. 2010)	Development of conflict techniques for left-turn and cross-traffic at signalized intersections
(Chai and Wong 2014)	Micro-simulation of conflicts involving right-turn vehicles at signalized intersections: cellular automata
(Shahdah, Saccomanno et al. 2014)	Conflict model for estimating crash modification factors
(Essa and Sayed 2016)	A comparison between PARAMICS and VISSIM at signalized intersections
(Costescu, Raicu et al. 2016)	Using intersection conflict index
(Cunto and Saccomanno 2008)	Simulation calibration and validation of safety at signalized intersections



Conflict study at freeway area: In the first study (Yang and Ozbay 2011) based on the yes-statement for each conflict, the probability for the correspondent conflict can be calculated and then the correlation between crashes and conflicts is found. It is stated that the level of conflict risk between vehicles depends strongly on merging positions and lanes of vehicles and will have a smaller value at the end of the auxiliary lane. The reason is that it's difficult for vehicles on merging positions to avoid a conflict that can lead to an accident. In the third study (So, Lim et al. 2015), the results show that the value of the coefficient correlation between the EB-SPF method and the conflict-based method is higher than between the EB-SPF method and the crash frequency method. It means there is a better correlation between EB-SPF method and the conflict-based method. As a consequence, the conflict-based method is preferable to be used as an alternative way for safety evaluation in comparison to the crash frequency method. In the fourth study (Fan, Yu et al. 2013) As a result, the value of the coefficient correlation increases after linear regression analysis and the consistency between conflicts is verified in the freeway.

Conflict study at signalized intersections: In the first paper (El-Basyouny and Sayed 2013), the estimated parameters from the NB regression model in the result shows that for every 0.743% increase in predicted collisions, there is 1% increase in predicted conflicts. Therefore, there is a statistically significant correlation between conflicts and collisions.. In the second study (Essa and Sayed 2015) the TTC thresholds is namely 1.5 s and the correlation coefficient increases after two-stage calibration, the correlation between observed and simulated conflicts increases as well. It shows also the same result in the third study (Zhou and Huang 2013), the sixth study (Shahdah, Saccomanno et al. 2014) as well the seventh study (Essa and Sayed 2016). The results in the eighth study (Costescu, Raicu et al. 2016) indicate that the number of traffic accidents decreases because of an 80% reduction in traffic conflict index . As a consequence, there is a strong correlation of traffic conflict index with the reducing number of traffic crashes. Finally, the crash potential index per vehicle is found by the ninth study (Cunto and Saccomanno 2008) within the 95% confidence interval from the simulation model.

(Yang and Ozbay 2011)	Estimating Traffic Conflict Risk with merging vehicles on a highway merge section
(Lu, Chen et al. 2013)	A programmable calculation procedure at highway intersections
(So, Lim et al. 2015)	Exploring traffic conflict-based surrogate approach for safety of highway facilities
(Fan, Yu et al. 2013)	Using VISSIM and SSAM at freeway merge areas



The network in the second study (Sayed, Zaki et al. 2013) reports around one third of the number of bicycles recorded in automated computer vision analysis have the conflict. In conclusion, the validity of this safety measure is ensured because the conflict has a great impact on the safety issues in this region. It's observed in the first study (van der Horst, de Goede et al. 2014) that most bicycle conflicts occur in the crossing situation. Additionally, there is only a small number of bicycle conflicts when travelling in the same direction or in opposite direction. Thus, the validity of the traffic conflict is verified when investigating the conflicts in the different situations. In conclusion, due to the conflict frequency on hourly variation, crashes can be avoided by i.e. considering not to drive in the conflict region as less as possible at the time of high frequency.

(van der Horst, de Goede et al. 2014)	Traffic conflicts on bicycle paths
(Sayed, Zaki et al. 2013)	Vehicle – bicycle interactions diagnosis

