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Driver's Red Light Running and Moving Actions Prediction

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ABSTRACT: ***Driver's behavior prediction has been an unceasing concern for transportation safety divisions everywhere in the world. A huge amount of lives and properties losses thanks to the adversities at intersections and pedestrian crossings. Especially for countries with poor road safety technologies, this toll knows no bounds. A myriad of research and studies are mastered for technological evaluation and model representation over this issue. Instead, little comprehensive review has been made on the driver's behavior prediction at signalized intersections on red-light running and turning. This Paper aims at incorporating previous researches on driver's behavior prediction and the prediction parameters resulting in traffic violation like red-light running and turning at intersection and zebra crossing. The review also covers the probable crash scenarios by red-light running and turning and analyses the innovation of counter-crash technologies with future research directions.***

KEYWORDS: ***Intersection, Behavior prediction, Intersection, Turning, Red-light running.***

INTRODUCTION

Road crashes and therefore the resulting fatalities are one among the main health burdens that jeopardise human lives. Per annum, around 1.3 million people everywhere the world are killed by road mishaps with approximately 20 to 50 million life-threatening injuries. Notwithstanding, there's a disparity in road traffic death from 9.3 to 26.6 per 100,000 population among countries supported their income level, while the worldwide rate remains 18.2 per 100,000 population. Moreover, traffic collision at intersections may be a significant threat to upholding road safety. As an entire, 45% of severe injuries occur at intersections, including 22% of fatal crashes. Drivers often inadvertently fail to break immediately at the onset of red light or deliberately run through the red light signal and also miscalculate the motif of the proper angle vehicle [in a right-hand driving condition] while crossing the intersection . Especially at the onset of yellow signal, drivers get confused with decision measurement either to prevent or to run and to urge involved in rear-end collision or right-angle collision or uncomfortable hard brake, often leading to injuries or death[1].

Traffic guideline and signs exist to guarantee a smooth and safe traffic climate on our streets. Inability to stick to these traffic lights and guidelines can prompt perilous circumstances. On parkways and crossing points with high traffic volumes, such circumstances could bring about different human losses. One of the fundamental driver of auto collisions is the Red Light Running (RLR) issue. In, RLR vehicles are characterized as vehicles that continue through the crossing point while the sign is red or transforming into red. Such activities demonstrate that drivers submitting RLR tend not to notice the sign because of indiscretion or confusion. The level of deadly crashes in the United States rose by 15% between 2011 (29,867 cases) and 2016 (34,439 cases), and the general pace of mishaps rose by 17%.

Also, in nonjunctions (not a convergence), there were 31,616 vehicle crashes without traffic signal gadgets, on the other hand 1,336 accidents with traffic light gadgets in 2016. Nonetheless, in intersections, an aggregate of 926,294 deadly crashes furthermore, injury crashes happened and

649,067 of these accidents happened even with the traffic light gadgets introduced. From this measurement information, we can recognize that crashes at crossing points are bound to prompt genuine mishaps, contrasted with the cases in nonjunctions. Somewhere in the range of 2010 and 2014, a normal of 32,965 absolute traffic mishap fatalities were accounted for with a normal of 3,309 fatalities related with RLR in convergences [8]. Out of 880 respondents who addressed that RLR was perilous, 20 percents of respondents revealed that they have encounters of submitting RLR petty criminal offense also [9]. From the investigation on variables influencing the event of RLRs, a review of 1,373 signal-disregarding drivers in Arlington and Virginia from 1994 to 1995 reasoned that the majority of them were more youthful drivers with short driving experience.

They were likewise less inclined to wear safety belts and had disregarded speed guidelines different times before. Alongside the human factors, the Federal Parkway Administration (FHWA) likewise portrayed extra factors that influence RLR when planning crossing points, for example, level, helpless perceivability, side of the road deterrents and line of murmur.

Aside from the injuries and fatalities of automobile crashes at the intersection, vulnerable road users also bear a serious share in road traffic price. In developed countries just like the UK, the pedestrians' death rate is nineteen times higher per kilometer travelled than drivers. Moreover, in 2012, around 2071 cyclists lost their lives in European Union where Denmark, Portugal, Italy, France, Romania, the Netherlands and the UK each contribute more than many cyclists' lives. In 2019, 160 pedestrians died on Australian roads, and therefore the death rate of vulnerable road users is 34.34%. Deliberate actions and passive factors are considered to be responsible for significant. An inexperienced driving attitude may have an adverse effect on the intersection and zebra crossing. The vehicle driving dynamics like acceleration, speed, coping up with the oscillation and therefore the gradual[2] change in steering moments are major considerable parameters for maintaining road safety as they pertain to the interaction between driver's decision and surface uniformity. Moreover, deliberate intention to traffic violation creates disposition for aggressiveness, which ends up in additional frequent traffic collisions. Another reason for traffic collision is speeding[3].

Drivers who are indulged in swift driving, thrill-seeking or maintain aggressive nature, peer pressure, and rushes extensively to save lots of time are more likely to violate traffic rules and obtain involved in clashes . Among them, red-light running and turning is taken into account the foremost deadly approach for frequent traffic collisions at the intersection, like right-angle collision and rear-end collision at signalized intersections[4]. At the signalized intersection, the red signal is symbolized to prevent the vehicle when activated. If the vehicle invades the intersection after the activation of the red signal, the behavior is assessed as Red-light running[5]. Even the drivers often hit other vehicles and vulnerable road users during turning at the intersection, and therefore the frequency of such collision is critical. In such cases, pedestrians are considered as most pregnable as they are revealed unfortified in crashes relative to automobile occupants[3]. Consistent with previous researches, red-light running plays a robust encounter role against the long-desired project of ensuring road safety at signalized intersections. It also acts as a primary barrier in upholding ultimate "vision zero" road safety program[6].

LITERATURE REVIEW

Traffic violations and accidents related to red-light running and illegal turning take a huge toll on human life and infrastructure. Millions of budget and endless attempts are being made in the field of road safety, and yet the result would not lead to a sufficient removal of a traffic crash as the ideal vision zero project[7].

DISCUSSION

The review was done comprehensively on driver's behavior prediction on red-light running, and turning and potentiality of previous researches are discussed also. Aside from existing prediction parameters, new parameters like weather, lighting, period of days are needed to be taken into consideration for building prediction model. The various machine learning and deep learning-based prediction model and prediction parameters are reviewed systematically also because the data collection strategy. Different survey questionnaire analysis and therefore the risk of vulnerable road users are evaluated during this review analysis. Various number of characteristics of drivers and pedestrians like gender, age are found as important parameter from survey analysis and these also are required to be considered such prediction model. Also, different crash identification and crash histories are evaluated from the Queensland government open-source crash data from 2001 to 2018. Majority of crashes occur by red-light running and turning are buttocks collision and right angle collision.

Also, considering the first and secondary interactions for pedestrians is crucial to reduce the death rate of vulnerable road users. Secondary through interactions are found most threating in this regard. Some counter measurements of crash and traffic violation also are investigated with their recent modifications and innovations. From the analysis, some flaws and gaps of previous research are found, and therefore the probable further studies on those gaps are discussed too. CITS safety message communication system and dynamic all red extension system is found more reliable and promising up to present state of research improvement. EEG based behavior prediction is recent technology and wishes tons of research for its feasibility on road. Other intersection control managements like flashing signal and countdown timers are found questioning in recent researches. However, this review is the sound footing for the practical implementation of conventional vehicles and also connected vehicles. The previous research of drivers' assisted technology is additionally covered here, but the review apt little for fully autonomous vehicles. Moreover, the evaluation of this review is predicated on the signalized intersection. The studies of normal non-signalized intersections are out of scope here except the turning condition analysis on primary and secondary interactions. Also, the reviews on lane-changing manoeuvres are hardly discussed here, and a few crash scenario on lane-changing consequences are mentioned only. Above all, the review was done profoundly for the moto of encouraging further research in driver's behavior prediction on red-light running and turning and stop traffic violations and collisions for the pragmatic execution of vision zero.

CONCLUSION

Traffic violations and accidents related to red-light running and illegal turning take a huge toll on human life and infrastructure. Millions of budget and endless attempts are being made in the field of road safety, and yet the result would not lead to a sufficient removal of a traffic crash as the ideal vision zero project. Researchers are also dealing with what they have in, accumulating prior studies with their own thoughts to create new concepts to address road safety issues. Driver's behavioral prediction for red-light running and turning is an ongoing research subject for addressing traffic crashes, and our systematic analysis covers thoroughly the relevant fields and criteria of driver behavioral prediction for red-light running and turning. This study is also a strong match for previous research examination of the connected car, which is a ground-breaking step in new technology to simplify the driving role of the driver as well as to eliminate traffic accidents. With a slight look at the accident situations, researchers would be at ease in recognizing the possible crash conditions by red-light running and imprecise turning. Tech methods, such as deep learning and machine learning, are also highly promising in tackling traffic crashes and road safety issues. These computer science and artificial intelligence application algorithms, a prediction model, major parameters and data collection technology are also analyzed in this analysis to make science more available to the devoted researcher.

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