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Literature Survey on Detecting and Handling Traffic Violation

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ABSTRACT-This paper addresses the issues in the Indian scenario of traffic violation detection system. Violations in traffic laws are very common in a highly populated country like India. The conditions are even worse in metro cities like Delhi, Mumbai Bangalore and Chennai. The accidents associated with these violations cause a huge loss to life and property. There are plenty of traffic rules that one should follow before getting his or her vehicle on the road. It becomes the biggest challenge to make people abide by traffic rules. Much different automation has been proposed to automate and to make it happens in India. In this paper, we proposed a smart traffic violation detection system as a solution for the traffic violation issues in the Indian scenario. The advanced and intelligent form of visual computing will assist in detection of name plate which will be integrated with Aadhaar Card and Registration certificate for automatic generation of E-challans. E-challan alerts will sent to owner of violating vehicle immediately through sms and email according to classification of violations. The evidence of footage will be sent to online E-challan portal where owner can have a check.

KEYWORDS: Image processing, Vehicle detection, Violation detection, YOLOv3

I.INTRODUCTION

Violations in traffic laws are very common in a highly populated country like India. The conditions are even worse in metro cities like Delhi, Mumbai Bangalore and Chennai. The accidents associated with these violations cause a huge loss to life and property. Same is the case in Chennai. Being a metro city and a highly populated one also, has a lot of road accidents every year. Despite this the violations in traffic laws do not reduce. A lot of people disobey the rules every day sometimes willingly and sometimes because they are forced to do so because of others.

While lack of good infrastructures like quality pothole-free roads, bridges and underpasses are some of the reasons for traffic jams and vehicular accidents in the country, disobeying of traffic rules is another reason why the state of affairs associated with the traffic management in India is in a pathetic condition. Traffic signal is automated or sometimes manual signal at a junction or crossroad in a high traffic area designed for a smooth flow of traffic without jams. This sounds great in theory, but the only problem here is that even if one person doesn't follow the rules of a traffic signal, then it can cause traffic jams at such junctions. The three traffic signals are color coded, which are red, yellow and green. Traffic signal poles will display these signs in front of the vehicle.

When the signal is red in front of a road, then the vehicles have to stop behind the zebra crossing. When the signal is yellow, it indicates that the vehicles need to get ready to move. And at the turn of the green signal, traffic can move. This cycle keeps repeating every once or twice in a minute depending on the traffic density. Such signals are present even for pedestrians. To guard and catch hold of traffic violators, the traffic police will be present to manage the situation properly.

The smart violation detection and alert system will assist the human guard without getting tired. Vision computing has also been a matter of curiosity and challenge among researchers and AI practitioners to make AI vision as efficient as a human being. Machine learning, especially deep learning, has proven as a great methodology to make it happened up to an extent. If we want to make a machine as efficient as a human being, which is the prime target of Artificial Intelligence methodology, then the machine must have eyes to look and feel the situation in real-time. The new form of

visual computing as stated above is a key to the same. Hence Deep-Learning based AI vision computing environment really making this happened in present time.

In this paper we mention a human-based traffic control system in a similar fashion with similar feel like a human being, smart vision computing-based system. The system helps in detecting vehicle who violated law as well as sending sms email alerts immediately to the owner and traffic control room with evidence of video recording .

II. PRELIMINARIES

In computer vision, the proposal of YOLOv3 satisfies the Research and application requirements of many fields and provides novel ideas to the development of traffic violation detection system. Nowadays, the image and vision field receive the most attention from YOLOv3. YOLOv3 is suitable for traffic violation detection due to its fast object detection and processing speed. After the initial development of the YOLOv3 theory, several research works were published to extend the idea as well as its applicability in various domains. Design starts by analyzing the input key parameters, from the video sequence, which is read in the frame by frame separately. Each digital video is feed into as a frame by frame where the input can be divided into two different parts those are background part and foreground part. The background part, which contains the environment, is mostly stable and remains unchanged throughout the video and the foreground part, is where all the moving objects are detected. The output of this is feature representation which is the most important information related to traffic violation detection. By using YOLOv3, three features are obtained and those are class of the object, bounded box, and semantic segmentation. Which is later used to determine the type of traffic violation.
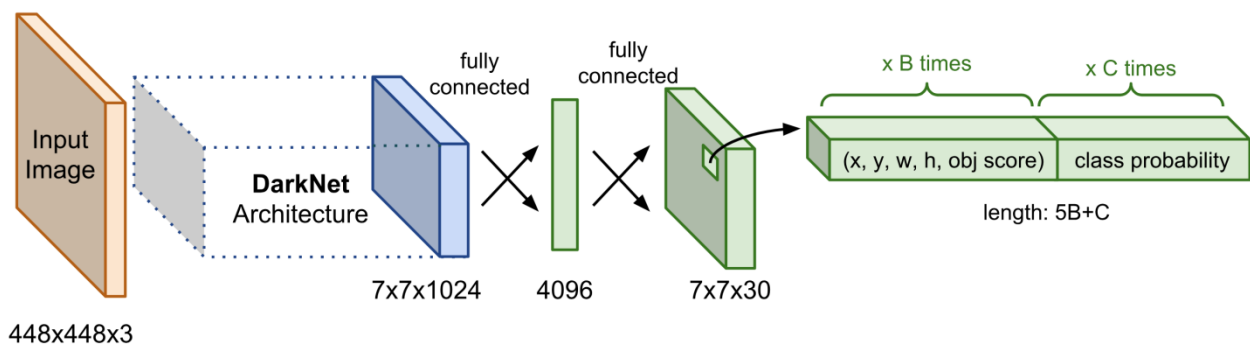
III. RELATED WORK

An initiative by **Delhi Police in the National Capital Region (NCR)** with support of Maruti Suzuki India aims to promote the road safety campaign in NCR region. The objective behind this initiative is to highlight the country's traffic regulations in a transparent manner. The objective of this scheme is to reduce accidents and fatalities. The focus of the proposed system was on its automated behavior and transparency. The system includes 100 high resolution cameras and sophisticated 3D radar units to track the presence of vehicles and other entities. Moreover, to capture multiple offences such as Red Light Violations, Speed Violations, Stop Line Violation and Wrong Side Violation; an automatic camera having feature of license plate recognition had been proposed .

The first step of proposed system is the detection of violations in real time. The automated cameras capture video and images which results in fruitful benefit to security personnel and traffic management operators. With the relevant findings, they can quickly access the activity and can respond with comprehensive situations and above all they are exempted from having to collect evidence on-site. The two smart detectors such as red light violation and automatic number plate recognition, playing a vital role in today's scenario. Overview camera which comprise of red light violation detection system and automatic camera consists of number plate recognition system. The system starts capturing the red light violation as soon as traffic signal turns red and considered as an input for further proceedings. The new system comes with user friendly interface that provides important facts such as image of the number plate; image of the vehicle; speed violation detection; date, time and location of offense.

Another initiative **regarding smart traffic signal system establishment came into existence in Hyderabad in 2014**. The new smart system has number of features which help in detecting a motorist who commit violation. The automated camera and smart sensors will detect photos, video footage that will be transmitted to their data center for further

proceedings. Based on these facts and information, a case filed against the default motorist and E-Challan will be issued.

Another smart traffic **violation detection system was proposed in Bhubaneswar** where two parameters were taken into consideration, namely, red light violation and speed violation. In the first case, proposed system captures image of the vehicle who found violating the traffic rules. Once the traffic signal turns red, the proposed system starts capturing the violation (if any).Whereas in another case, the proposed smart system monitored the speed of the vehicle as well as capture photo of its number plate. These above two discussed initiatives will help the cops to trace those violators easily who are in the category of habitual offenders.

Some of the **smart violation detection systems already implemented in cities like Gurugram, Noida, Greater Noida, Ghaziabad, Faridabad, Bengaluru and Chennai**. Thus making a positive impact as a result of less fatal accidents and reduced traffic congestion. For further proceedings, radar based three dimensional automated camera were installed which are capable enough in detecting the violations as well as to monitor those defaulters who were jumping the red light. Under the smart city program, Chennai city is also following the similar practice by installing automated and smart cameras. This project is being implemented to catch those cases that are coming under the scenario of violations such as over-speed, jump signals and illegal parking of vehicle.

The new system, which would automatically detect violators if someone jumps a red light and also generate an E-challan, is being implemented under the **Smart City project in Raipur**. Red Light Violation Detection System will allow traffic cops to keep track of violators and generate an E-challan, which would then be handed over to the violator. The system would consist of camera-mounted sensors for better detection of traffic violations, which would relay the data to the central control room managed by the Traffic Department.

One of **the renowned organization Devfolio proposed smart traffic system** in which camera was considered as primary equipment to monitor the various activities of traffic. Over-speeding is one of the important issues and has taken a shape of high risks now-a-days. The aim of this organization is to monitor on rule breakers and protect from road accidents through their automated systems. With the help of smart automated camera equipments; they will trace the violated vehicles and report to the concerned authorities to take strict actions against defaulters. Moreover, they will trace over-speeding vehicles with the help of expert system based learning algorithms.
An overview automated camera is one of the best utility in smart traffic violation detection system. It shows the entire view of violation. The proposed system is having state of the art, user friendly interface for smooth operations. The overall results in the form of capturing and delivering report were active and suitable for tracers to avoid violations and other disruptive activities.

Chauhan et al. in used CNN based modeling for object detection by training on different and multiple vehicle classes over the dataset of Delhi roads traffic and obtained significant classification count accuracy.

Prouzeau et al. in proposed and named wall display: an synergistic model for traffic monitoring to visualization, interaction, traffic modeling, to realize potential impact of performed traffic modeling settings on global or local.

In **Marti et al.**, proposed a multi-agent system based traffic monitoring and management system that works in two mode of operations, coordinately – where all agents would work towards solution and the locally mode where some essential will work only.

In, author focused on causes of urban traffic congestions and intelligent transportation. Big data analytics is used on IoT based collected data for traffic prediction modeling, with real-time monitoring and further analysis for integrated supervision.

IV. DISCUSSION

The deployed system will be capable of detecting and recognizing different dimensions, contrast, colors license plates with variety of character font style therefore providing high accuracy for heterogeneous number plates. After detection there will be classification of violation according to violation immediate mobile alert will be sent to owner and vehicle control room there will be no delay in receiving E-challan alert. The given model will use the existing HD capturing units and will classify the predefined class of violation with the help of vision computing (YOLOv3).

V. FUTURE WORK & CHALLENGES

After analyzing several techniques we proposed an approach to make automate traffic detection system more accurate and reducing delay time in sending mobile alert and expecting for betterment of result.

V1. CONCLUSION

After studying different approaches we observe that some of the approach provides good techniques for automated traffic detection system, but still there is need of an approach which will provide more accuracy in stopping accidents and make owner abide by rules. Indian traffic is highly unorganized as far as the local city traffic is concerned. Monitoring, Modeling, and Management of traffic violations have always been a curious topic for researchers to discover new solutions. In name of smart automation different systems have been proposed and implemented. The existing model focuses on detection of vehicle but there is delay in sending E-challan to owner who violated law. The deploy model focuses on detection of vehicle using YOLOv3 algorithm. The prototype & experimental setup demonstrated with a satisfactory accuracy of classification and immediate real-time alerts based on classification of violation without any delay. This work will lead us to be smarter in recognition of the owner or current driver to make them abide by-laws

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