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Traffic Rules Violation Detection System

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Abstract - *Obeying traffic regulations is an obligation for every driver. Although obeying traffic regulations is mandatory, there are many violations that occur on the road such as breaking through road markings or traffic lights. The police have implemented many innovations to reduce the occurrence of traffic violations, but they are still inefficient in handling traffic violations. In order to ensure safety measures on roads of India, the identification of traffic rule violators is highly desirable but challenging job due to numerous difficulties such as occlusion, illumination, etc. In this, an end-to-end framework for detection of violations. The traffic violation detector can identify signal violations, and the individuals are informed that they will be apprehended if they break a traffic law. The system is faster and efficient than human, as known already traffic police is the one who captures the image of individuals violating traffic rule but the traffic police will not be able to capture more than one violation Simultaneously real-time through computer vision techniques and it also leverages good results with great accuracy. The violation detection included such as helmet classification, speed violation detection, detection of more than two people riding on the bike and detecting of accident possibly.*

***Key Words*: Traffic rules violation, Helmet Detection**

1. INTRODUCTION

The increasing number of cars in cities can cause high volume of traffic, and implies that traffic violations become more critical nowadays in Bangladesh and also around the world. This causes severe destruction of property and more accidents that may endanger the lives of the people. To solve the alarming problem and prevent such unfathomable consequences, traffic violation detection systems are needed. For which the system enforces proper traffic regulations at all times, and apprehend those who does not comply.

authorities track the roads all the time. Hence, traffic enforcers will not only be at ease in implementing safe roads accurately, but also efficiently; as the traffic detection system detects violations faster than humans. This system can detect four types of traffic violation in real-time which are wearing helmet or not, speed violation, violation of more than two people riding on the bike and accident possibility because of over speed. Two-wheeler is a highly common mode of transport, but due to less protection, there is a high risk involved.

2. PROBLEM STATEMENT

Due to the growing population more automobiles are being purchased, particularly in urban areas. This can result in heavy traffic, indicating that traffic violations are becoming more dangerous in every corner of the world. As a result, people's awareness decreases, and there are more accidents, which may result in the loss of many lives.

These situations necessitate the need to develop traffic violation detection systems to automate traffic regulations and eliminate the unawareness among human population. The proposed traffic violation detector can identify signal violations, and the individuals are informed that they will be apprehended if they break a traffic law.

3. LITERATURE SURVEY

Due to the growing population more automobiles are being purchased, particularly in urban areas. This can result in heavy traffic, indicating that traffic violations are becoming more dangerous in every corner of the world. As a result, people's awareness decreases, and there are more accidents, which may result in the loss of many lives.These situations necessitate the need to develop traffic violation detection systems to automate traffic regulations and eliminate the unawareness among human population. This paper will discuss various methods that are already proposed by different researchers. The paper focuses on the following major modules:

A. Vehicle Detection

B. Helmet Classification

C. License Plate Recognition

D. Speed Violation

One major drawback using canny edge detection is, it detects all the edges in the image and we need to then carry out further processing to select only those edges which actually belong to the number plate.

There is an end to end system for for these features but we will be adding different features such as speed violation, violation of more than two people riding on the bike and helmet classification.

3.1 SCOPE OF THE PROJECT

In the existing system traffic police stand at signal and when a violation is observed by the team, the license number plate is noted and a screenshot is taken for proof. The system is useful as it automatically detects the traffic rule violation and when the violation occur it will give the alert massage to the police The system will be time saving.

4. METHODOLOGY

In this section, we will explain the end to end system. This system consists of four major components. In the system we will first give an image frame from CCTV footage as input to the system then perform vehicle detection using Object Detection. Object Detection is carried out using YOLO (you look only once) for detecting vehicles in the image frame. After detecting

vehicles, individual vehicles are cropped out using the coordinates obtained from bounding boxes given by Object Detection Algorithms. Now an individual vehicle is checked against different violations. Violations included in this proposed system are Helmet Violation (Two-wheeler rider not wearing a helmet) Speed Violation, Violation of multiple people riding on the bike and Violation of accident possibility due to over speed.

Two-wheeler vehicles will be checked against Helmet and multiple people riding Violation and Four-Wheeler vehicles will be checked against overs speed and accident Violation. Helmet violation is detected using CNN (Convolutional Neural Network) based classifier which works well on visual data

4.1 PROJECT MODEL

Fig -1: Project Model

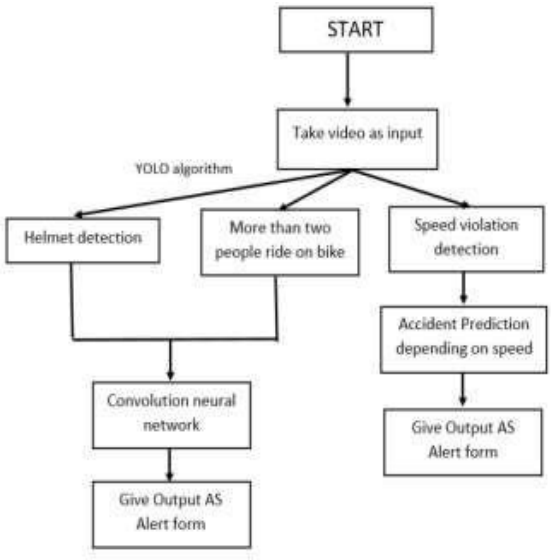

Fig -2: Project Working Model

Flowchart for Helmet Model Procedure for training a YOLOV3 HELMET model Gatheringimages (Creating data set): To detect a bike riderwith helmet or without helmet.

4.3 CNN Model

The system consists of a main subsystem: setting up the environment, training, testing the model and getting the accurate coordinates of the vehicle that comes along with the

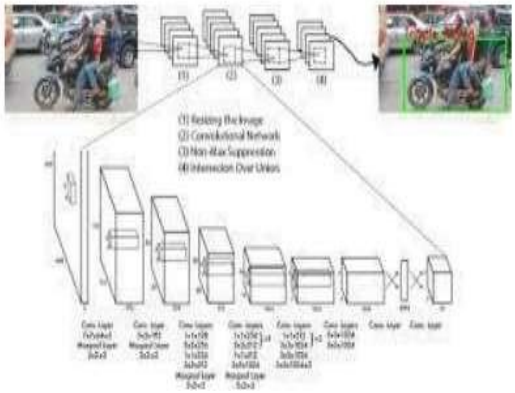

Fig -3: CNN Model

system. The Proposed system of triple riding is illustrated. The imposing challans or fines with an automated push of the data to the respective useraccount comes as an extension to the system. Proposed Model of triple riding detection. Trafficrule violation recognition system.

4.4 SYSTEM ARCHITECTURE

In this section, we will explain the end to end system. This system consists of four major components. In the system we will first give an image frame from CCTV footage as input to thesystem then perform vehicle detection using Object Detection. Object Detection is carried outusing YOLO (you look only once) for detecting vehicles in the image frame. After detecting vehicles, individual vehicles are cropped out using the coordinates obtained from bounding boxes given by Object Detection Algorithms. Now an individual vehicle is checked against different violations. Violations included in this proposed system are Helmet Violation (Two-wheeler rider not wearing a helmet) Speed Violation, Violation of multiple people riding on the bike and Violation of accident possibility dueto over speed. Twowheeler vehicles will be checked against Helmet and multiple people riding Violation and Four-Wheeler vehicles will be checked against overs speed and accident Violation.

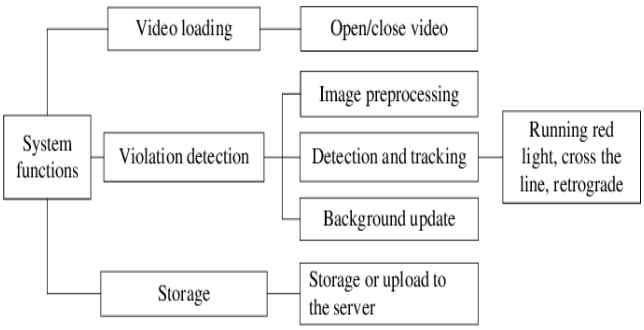

Fig -4: System Architecture

5. RESULT

Speed detection

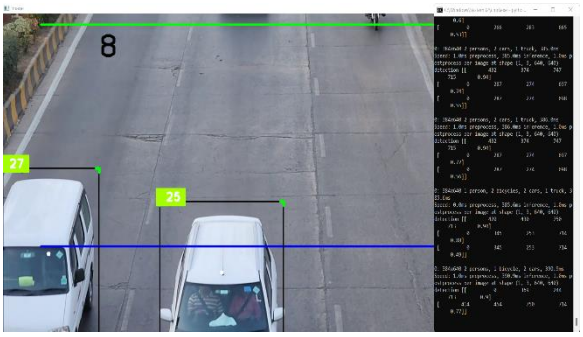

Fig -5: Speed Detection

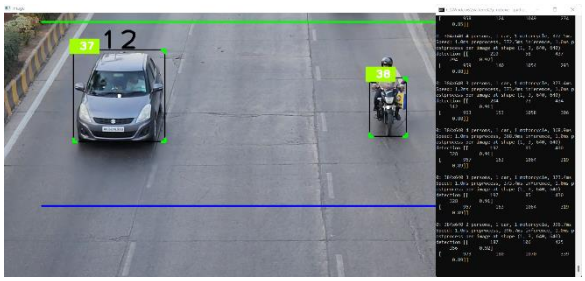

Fig -6: Vehicle Speed Detection

Fig -5: Vehicle passing on the road

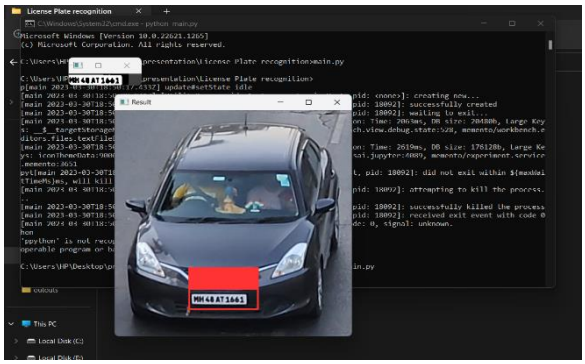

Fig -5: License plate recognition

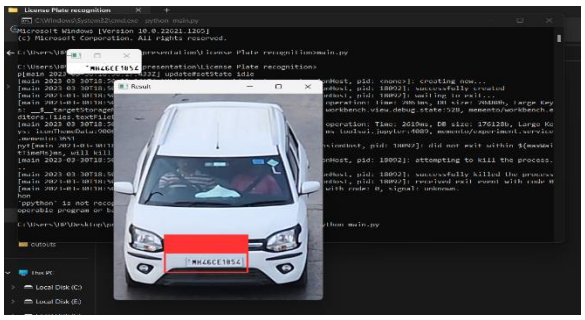

Fig -5: License plate recognition

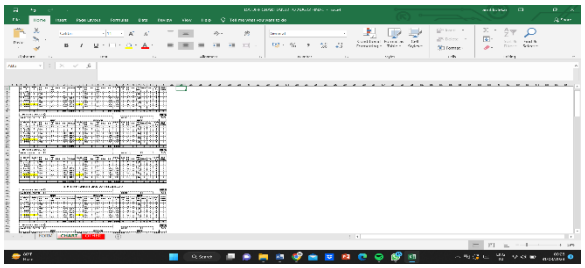

Fig -5: database Vehicle Information

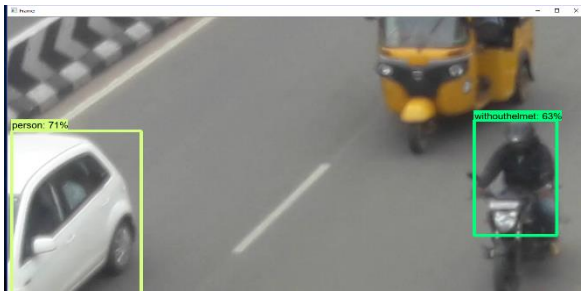

Fig -5: Helmet Detection

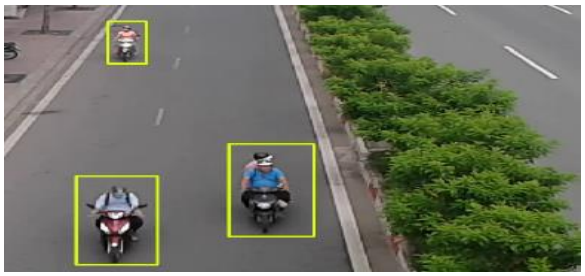

Fig -5: Two Passenger on bike

6. CONCLUSIONS

The approach employs the use of concepts such as YOLO, CNN, Image processing for automaticdetection of traffic rules violations. It achieves the desired goal with precision and ease, butrequires high computational power as it makes use of concepts like image segmentation andobject detection. The advantage of the system is it has the ability to catch more number of violations as compared to the human intervened system. In addition, the proposed methodology provides an end to end autonomous system, when implemented would prove an upper hand in detecting violations

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