Detecting Traffic Rules Violation.

[1]Tanishka Suresh Shivanikar, [2]Pratiksha Zumbar Tarange, [3]Sandhyarani Pawar, [4]Mrs. Shrikhande

[1,2,3]Department of Computer Engineering, Marathwada Mitra Mandal's Polytechnic Maharashtra, India

[4] Faculty of Department of Computer Engineering, Marathwada Mitra Mandal's Polytechnic Maharashtra, India

A B S T R A C T

With the growth of number of vehicles, the number of traffic accidents is rapidly rising. Therefore, it is important to capture traffic violation to ensure traffic safety and reduce traffic accidents.

Traffic violations are the most important cause of accidents. This system can effectively capture violations. It helps drivers strengthen awareness of safety when driving and ensure smooth traffic flow.

Statistics of road accident : 2018 saw a total of 4.61K road accidents across India as compared to 4.65K in 2017. Though the number of road accidents have dipped marginally, the same cannot be said where road fatalities are concerned. This figure which stood at 1.51K in 2016, dipped to 1.48K in 2017, which went up to 1.49K in the past year.

Keywords: Python, Open CV, TensorFlow, Yolov5 etc.

Introduction

The cause of maximum number of road accidents was reported to be over speeding, violating traffic rules and rash driving — about 403 such cases were reported in which 227 people died and 397 were injured.

The second highest number of road accident cases in State is due to people's tendency of driving on the wrong side and not wearing helmet. About 112 road accidents cases have been reported under this category, in which 62 people were killed and 115 were injured.

Third major cause of road accidents in Uttarakhand is people wrongly overtaking the vehicle moving ahead and not using helmet while traveling. Which caused about 96 accidents in which 54 people lost their lives and 103 were injured. According to the report titled "Road Accident Analysis in Tamil Nadu March 2019", out of the 978 persons killed in the accidents involving two-wheelers, 508 riders and pillion riders did not wear a helmet. About 52 per cent of the death in twowheelers were occurred due to non-wearing of helmets.

A year after motorcycle crash, Jim Lumley still thanks his helmet: A Northern Express Apr. 29, 2013, article wherein Jim explains he is glad he was wearing his helmet at the time he was involved in a low-speed crash even though the law in

Michigan had changed the year before to make wearing a helmet optional. The low-speed crash turned out to be highstakes for Lumley, who suffered a serious injury to his knee. He also believes he owes his life to the helmet that cracked when it hit the windshield. It was a high-end, $350 helmet, with an air cushion that inflated to further protect his head. The helmet was destroyed in the crash. "Literally, I could have legally been riding without a helmet, but I chose to wear a helmet," he said.

Hence to avoid this accidents our system is very useful.

Objectives of our project

The goal of the project is to automate the traffic rules violation detection system and make it easy for the traffic police department to monitor the traffic and take action against the violated vehicle owner in a fast and efficient way. The violations such as

- Sign detection
- More than two people on a motorcycle i.e. triple seat detection

- Helmet wear or not

Scope of the Project.

Different traffic rule violation detection devices are available in the market as follows:

a)   Traffic detection system using Android.

b)   Violation Detection at Traffic Signals using RFID System.

c)   Detecting traffic light signals.

Limitations:

The existing system has the following limitation:

- Manual work.
- No mechanism for tracking jobs.
- No streamline methodology/features for payment ● Unregulated business process.

The system can be designed by considering the new technology. In future this project can be linked with IOT where all the data can be shared among the RTO offices and penalties can be charged to violators. The system can also be linked with RFID communication more efficiently. pansion, new product launches, and targeted

Literature Survey

A literature survey in a project report is that chapter which appear the various synthesize and research made in the field of your interest and the results already published, taking into account the various parameters of the project and the limit of the project. Literature survey helps to decide our direction for research. Literature survey helps to set a goal for your analysis – hence it giving you your problem statement.

According to the increasing population of peoples and vehicles on the road used by those peoples, there are many issues created like traffic violation on road, security of peoples from accidents, increasing accidents on the roadside and also increasing the workload of traffic police and government too. Surveys carried out by experts have mentioned different traffic rule violation detection devices. Traffic rule violation tasks include:

• Sign detection

• More than two people on a motorcycle i.e. triple seat detection

• Helmet wear or not

We can see the papers as mentioned below:

[1]   In this paper, a system for traffic violation alert and management has been presented. The proposed hardware architecture combines an on - board computer vision system for traffic sign detection and a data recorder for managing traffic violations. The warnings come in the form of acoustical messages emitted through the vehicle loudspeakers, and they are issued with sufficient time to provide the driver with enough notice to react to the on - coming traffic situation.

[2]   This paper have presented a traffic-monitoring approach for vehicle tracking based on rule-based analysis. The system pattern is structured between the low-level image processing modules that is used for extracting visual data of vehicles under various illumination circumstances and the high-level image processing module that provides a general-purpose knowledge-based framework for tracking vehicles in the scene. Based on adequate image-analysis algorithms, the low level image-processing modules extract vehicles from the current frame. The high-level processing module is developed as a forward chaining production system

[3]   This paper aims to give an idea about the number of traffic offenders in an area. It generates a database of all the bike rides driving without wearing a helmet along a snapshot for proof. Use of Open and free technologies like tensorflow, opencv and tesseract, makes the software relatively less expensive. Under fair lighting conditions, this system was tested to give fool proof results.

[4]   explored the detection of motorcyclists without helmets in videos utilizing a convolutional neural network (CNN) architecture. They construc ted and evaluated a CNN model on a large-scale dataset, achieving high a ccuracy and highlighting the effectiveness of CNNs for helmet detection.

Furthermore, to provide a broader understanding of the techniques and c oncepts relevant to our research, the following papers were considered:

Adrian Rosebrock (2015)

[5]   discussed basic motion detection and tracking using Python and OpenCV, which laid the foundation for understanding motion-based detection approaches.

2.2 Problem Definition

Implement System to detect traffic rules violation.

Detail Working

Proposed Methodology

Architecture Diagram

Figure shows the architectural design of the system. It shows how our system modules will work. The first module is image recognition which starts the system by capturing images. Then according to the type of violation appropriate action will be taken against the person.
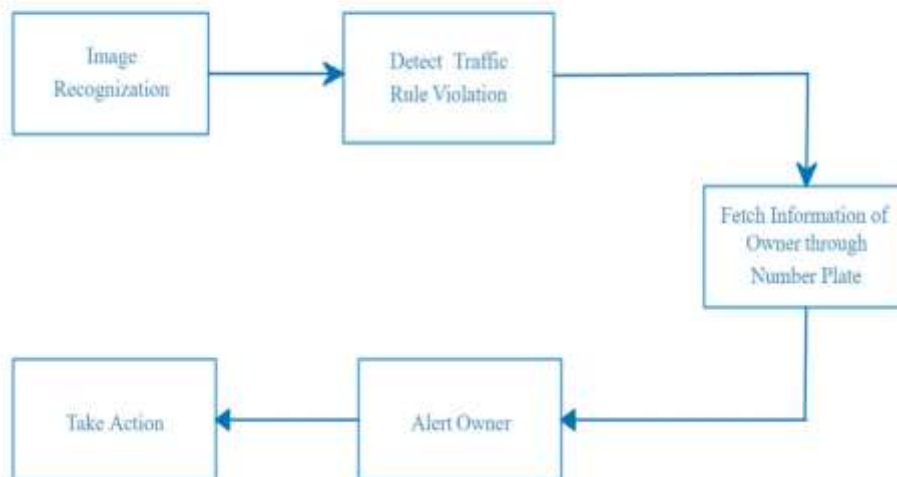
Data Flow Diagram

Level 0

Figure shows level 0 Data flow Diagram. The image or video is given as input to the system. The traffic rules detection system will detect all the violations as mentioned above by fetching the owner's detail from the number plate, violation status will be sent to the owner of the vehicle/motorcycle with an alert message.


Level 1

Figure shows the level 1 Data flow diagram. Which shows the internal models of the system. It includes:

- Number plate detection
- Sign detection
- Triple seat detection
- Helmet detection

Traffic violation detection system takes video as input. When the system found any one of the violations, it takes the number plate of the violated vehicle to fetch owner details such as owner name, city, mobile number, number on number plate that is stored in the file. To send the alert message to the owner of the vehicle, the System will fetch the mobile number and name of the owner that is linked with the number plate and sends an appropriate alert message.
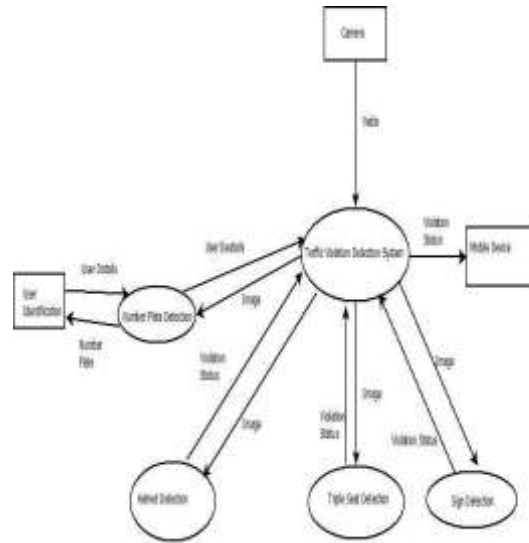
Requirements Analysis:

Requirements are features that the system will need in order to deliver or operate. In the case of this project, it was important to gather some requirements that will be needed to achieve the objectives set out previously. With client (user) story a use case analysis was implemented which resulted in the following functional and non-functional requirements were captured. The functional requirements have been gathered from the user story developed from the minutes collected during meetings with the client and are outlined here.

Functional requirements

1) Helmet detection

Input: - Video

Description: - The system will check whether the person is wearing a helmet or not. For this system will compare the image with a trained dataset

Output: - Helmet detection violation detect **Constraint**: - video should be clear.

Nonfunctional requirements

Reliability:

The System must give an accurate status of the violation. The System must successfully detect the traffic rule violations and take appropriate action against the driver of the bike efficiently.

Hardware and other Requirement

Hardware Requirements

- Ram: 8GB Ram

- processor: i5 and more

- Camera

Operating System Requirements

☐ Windows

Tools and Technologies Requirements Tools:-

- Anaconda

- Notepad++
- Bracket **Technology**:-
- Python Open CV
- Machine Learning
- Web Technology
- Eel python

Conclusion

In summary, this project has proposed a framework for detecting motorcyclists who are not wearing helmets from CCTV video and retrieving their vehicle license automatically. Using Convolutional Neural Networks (CNNs) and transfer learning, the system achieves high accuracy in identifying helmetless riders. However, the framework goes beyond just detecting these riders, as it also recognizes and stores the license of their motorcycles. By storing the framework provides a means of identifying and penalizing riders who violate helmet laws. This comprehensive approach makes the system an effective tool for promoting road safety. The implementation of this framework can have a significant impact on road safety, especially since it can be integrated with existing CCTV networks.

Future Scope

Furthermore, the use of transfer learning makes the system adaptable to different environments, making it a scalable solution that can be used in various locations. Overall, this project demonstrates the potential of using AI and machine learning to improve road safety.

By providing a comprehensive solution for detecting helmetless riders and identifying their vehicles, this framework has the potential to reduce accidents and save lives

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