TRAFFIC RULES VIOLATION DETECTION SYSTEM

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Abstract - The majority of vehicles on road in India is increasing faster because of which traffic management has become one of the main problems. The effective management of traffic is possible when every violation on the road is often detected. The use of conventional/manual method together with existing technologies to detect traffic rule violation is inefficient as a results of which traffic management has become very difficult. During this project, the system is proposed with the assistance of image processing technologies to detect major violation like over speeding and helmet detection together with number platerecognition process which will make job of traffic management easier.

***Key Words*: Data Collection, Python OpenCV, Object Detection, TensorFlow, OCR.**

1.INTRODUCTION

Traffic rule violations are now a big problem for the majority of emerging nations in the modern, changing world. Both the number of motorcycles on the road and the number of trafficlaw offences are growing quickly. Regulating traffic has always been difficult and risky to find violations. Despite the fact that Traffic management has automated, making it a highly difficult challenge. Varied plate sizes, rotations, and lighting that isn't consistent conditions at the time an image was taken.

The major purpose of this project is to control traffic rule violations correctly and efficiently. The proposed model includes a computer-based camera-based automated system for image capture. so as to detect number plates more quickly and simply, the project offers Automatic Number Plate Recognition (ANPR) approaches moreover as additional image-manipulation methods for plate localization and character recognition. The SMS-based module is employed to alert the owners of the vehicles afterdetermining the automobile number from the quantity plate, their traffic infractions.

The ability to extract and recognise the characters of a car number plate from an image automatically. is all that numberplate detection in this project entails. This system has a camera that can take a picture, locate a number in the picture, and then extract characters using a character recognition Programme. Due to the low cost and widespread use of motorbikes, rigorous regulations are necessary to prevent accidents. Since wearing a helmet is required by traffic laws, breaking them carries serious penalties.

2. LITERATURE SURVEY

Aniruddha Tonge *et al.* [2020] In the suggested technique, the system detects motorcycle using YOLO-based object detection, and then checks each motorcycle for particular violations, such as not wearing a helmet or crosswalk. A CNN (Convolutional neural network) based classifier is used to detect helmet violations. [1].

Ruben J Franklin *et al.* [2020] Computer vision-based violation detection systems are a highly effective instrument for tracking and penalizing traffic infractions. For traffic infraction detections such as signal violation, motorcycle speed, and motorcycle count, this system is proposed built using YOLOV3 object detection. [2].

Chetan Kumar B *et al.* [2020] Applications for traffic surveillance use object detection algorithms like convolution neural networks (CNN). A neural network has at least one hidden layer in the input and one in the output. [3].

Siddharth Tripathi *et al.* [2019] In this article they have used an intelligent known as CBITS. It will discuss the following function such as emission monitoring, accident identification. [4].

Helen Rose Mampilayil et al. [2019] This research offers a system that detects one-way traffic rule violations automatically and without the intervention of a person. Three-wheeled vehicles were taken into account because they had a higher proclivity for breaking one-way traffic laws. [5].

Ali Sentas *et al.* [2019] Techniques for analyzing videos are utilized in traffic research for a variety of tasks, including counting and classifying vehicles, detecting crashes, and evaluating traffic density. Vehicle identification, tracking wrong way violation detection are made possible with the proposedsystem. [6].

M. Purohit *et al.* [2018] The authors used four feature extraction techniques on the Raspberry Pi 2 (B), including Scale-Invariant Feature Transform (SIFT), Speeded-UpRobust Features (SURF), Template Matching, Oriented FAST, and Rotated BRIEF(ORB), to identify objects such as cars, helmets, license plates, and seatbelts for traffic data sets. [7].

S. P. Mani Raj *et al.* [2018] In the suggested system, where every step is automated, a good database may be kept to track driver records regarding traffic rule breaches. It also allows for the payment of fingerprints and facilitates in thedetection of unauthorized and drunk drivers. [8].

Shashank Singh Yadav *et al.* [2018] In this research, the Kmeans linear regression, z score and hierarchical temporal memory clustering algorithm are used to investigate trajectory based anamoly identification utilizing spatial temporal analysis. An object spatial localization is seen as an event. [9].

R. Shreyas *et al.* [2017] It is now incredibly difficult to control trafficand enforce the law by keeping track of every single car. Utilization of Automation Nowadays, plate recognition is used more and more to manage traffic flow and is comparable to the automatic electronic toll collecting method. [10].

3. PROPOSED METHODOLOGY

To design and develop a traffic rules violation detection system using Machine Learning.

4. WORKING MODEL

A PC is used in the recognition system to capture the car registration number plate. Under poor environmental conditions, as shown in the following point, car licence plate images are illegible when taken by the system:

1. Overexposure, reflection, or shadows result in poorlighting and low contrast.
2. Unfavorable weather conditions, such as rain or smog.
3. Images that are hazy.
4. lowering the image's illumination.

The system will recognize the vehicle's license plate and convert the photos to grayscale images. The grayscale photos are then converted to binary images, which only include the numbers '0' and '1'. Following the binary graphics, the system will segment the automobile licenseplate's personality. The character and number will be segmented for each separate figure. After that, all of the characters and numbers will be converted to binary form in terms of the matrix and recognized by the neural network. After that, image cropping and recognition come next.

1.Take a picture with your webcam.

2.Change the image's scale to a smaller size.

3.Determine the location of the number plate.

4.Segmentation.

5. Identification by number.

6. Save the file in the specified format.

1) Take a picture with your webcam: After Taking a picturewith your webcam. Save the captured image to a picture document for farther processing.

2) Convert the picture to binary format: Determine the opacity of the image. Calculate the image's correct threshold value. Using the computed threshold, convert the image to a binary picture.

3) Look for the number plate area. Determine the image's width and height. Fill little holes with numbers from the number plate to make the number plate region large enoughto isolate from the figure.

4) Separation Clipping the plate region extracts only a few of plate areas, reducing the amount of noise in the image.

5) Identification based on a number Create a template file from the template images you've saved. Resize the segmented image to meet the template's dimensions.

6) Save the document in the format you specified. In write mode, open a text file. Save the number recognition procedure's character to a text file in the format you decide.

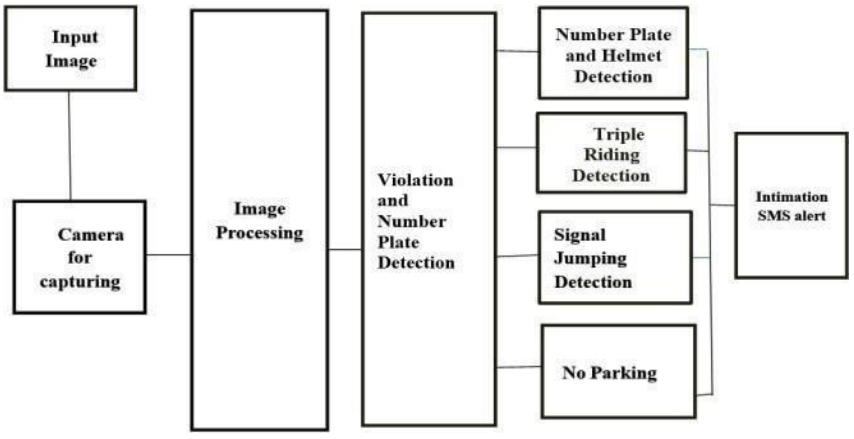

Figure 4.1: Block Diagram

5. RESULT AND DISCUSSION

In this study, a programme is being created to identify motorcyclists who do not follow the helmet laws. Motorcycle identification, helmet identification, and license plate recognition of motorcyclists riding without a helmet are the three main components of the programme. The main criterion is to use CNN to see if the A helmet is worn by the rider. When a rider is discovered without a helmet, the number plate of the motorcycle is recognised using tesseract OCR (Optical Character Recognition).The motorcycle/non- motorcycle categorization is 93 percent accurate, the helmet/non-helmet classification is 85 percent accurate, and license plate recognition is 51 percent accurate, for a total accuracy of around 76 percent. The accuracy will improve by increasing the training data collection and image quality.

Fig. 5.1. Front/Home Page

The home page allows the users to access the application.

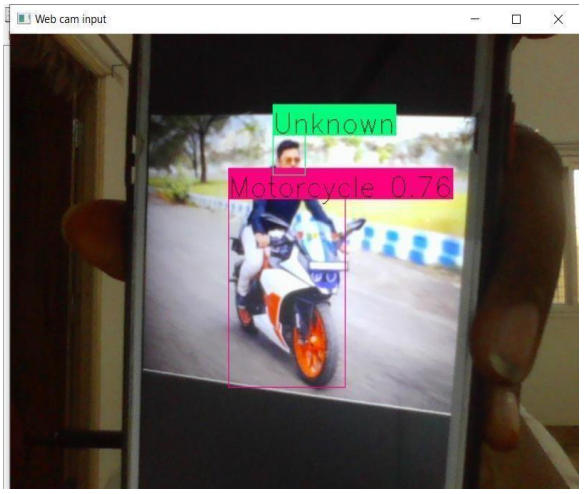

Fig. 5.2. Image capturing.

In this picture, the camera detects the motorcycle and alsodetects whether the person is wearing helmet or not.

```
lotorcycle
:&&&&&&&&&&
etected the Vehicle.....................
hecking the Helmet wearable thing.....
ursidedhsdfjdsfdsjklfjkfjkf;fdsfa;fd;fjd;fjdsfjdfjfdjfjdfjfasj
******
.5780115
elmet
:&&&&&&&&&&
:1111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111
nter     value 0
ount_Helmet: 1
elmet not Found Trying to Detect the Helmet
```

Fig. 5.3. Console Screen.

When the helmet is not found, then it is printed on thescreen.

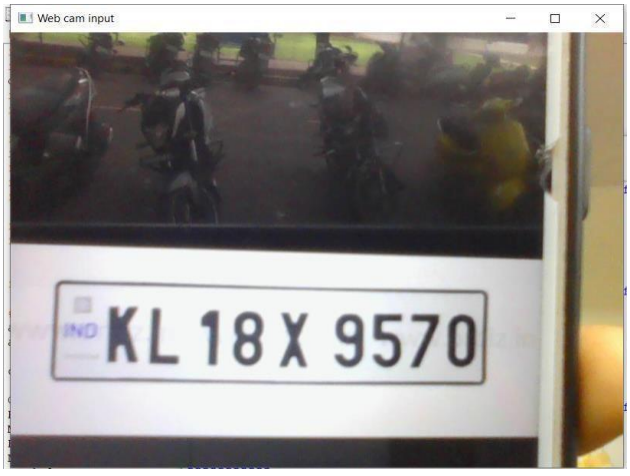

Fig. 5.4. Capturing the License plate.

Once the helmet is not detected, then the license plate iscaptured.

```
########################################
capturing the Image for Plate Detection
Captured the image for detection of NO.PLATE
KL18X9570
FPS: 0.10107067144833967
oursidedhsdfjdsfdsjklfjkfjkf;fdsfa;fd;fjd;fjdsfjdfjfdjfjdfjfasj
*******
```

Fig. 5.5. Detection of number plate.

The licence number is detected and printed on the screenafter the number plate is captured.

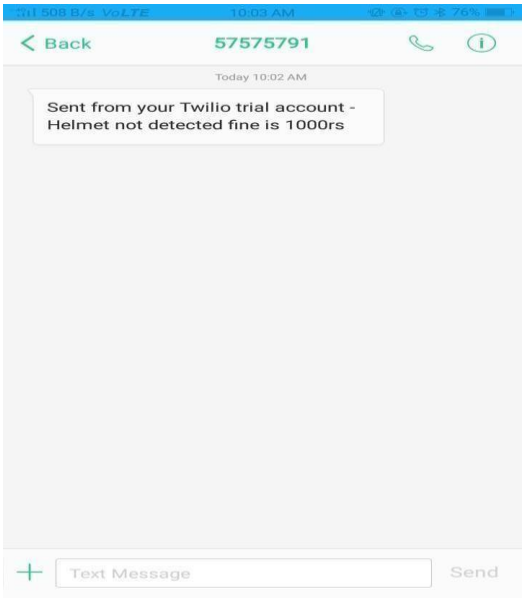

Fig.5.6. Message sent to the owner.

When a violation is discovered, a notification is delivered to the vehicle's owner.

Fig.5.7. Capturing Singnal Jump.

In this picture, the camera captures the red signal. When thered signal is captured, the signal jumping violation is detected.

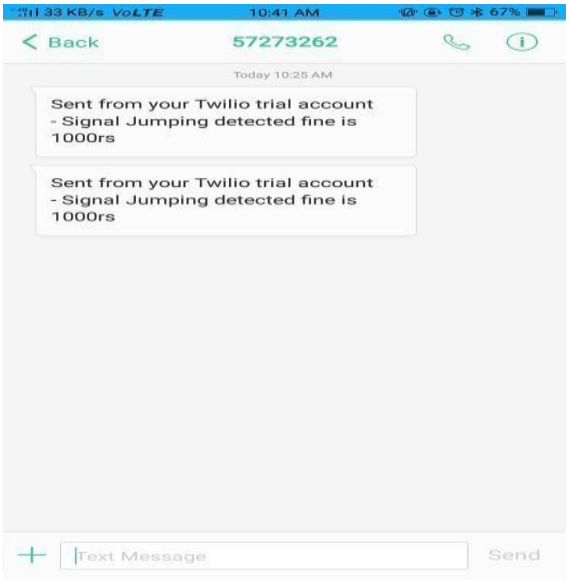

Fig.5.8. Message sent to the owner.

When the Signal jump violation is detected, then the message is sent to the owner who committed the violation.

6. CONCLUSION

The existing system is inefficient due to large number of vehicles on the road which makes it difficult to track multiple violations occurring at same time as a result of which manyviolators get away without being punished. The existing system requires lot of workforce hence adding extra pressure on the traffic officials. The proposed system can cover few of the loopholes in the existing system with features like multiple over speeding detection simultaneously, automatic helmet wear detection, triple riding detection system and violation/fine alert system hence providing better, safer and smart replacement to existing system.

7. FUTURE SCOPE

The traffic rules violation detection system can cover few of the loopholes in the existing system with the features like multiple over speeding detection simultaneously, automatichelmet wear detection, signal jumping, no parking zones hence providing better, safer and smart replacement to existing system for Traffic police in the road transportation.

8. REFERENCES

[1] Aniruddha Tonge, S. Chandak, R. Khiste, U. Khan and L. A. Bewoor, "Traffic Rules Violation Detection using Deep Learning," 2020 4th International Conference on Electronics, Communication and Aerospace Technology (ICECA), 2020, pp. 1250-1257,doi: 10.1109/ICECA49313.2020.9297495.

[2] Ruben.J Franklin and Mohana, "Traffic Signal Violation Detection using Artificial Intelligence and Deep Learning, "2020 5th International Conference on Communication and Electronics Systems (ICCES), 2020, PP. 839-844, doi: 10.1109/ICCES48766.2020.9137873.

[3] Chetan Kumar B, R. Punitha and Mohana, "Performance Analysis of Object Detection Algorithm for Intelligent Traffic Surveillance System," 2020 Second International Conferenceon Inventive Research in Computing Applications (ICIRCA),2020, pp. 573,579,doi:10.1109/ICIRCA48905.2020.9182793.

[4] Siddharth Tripathi, Uthsav Shetty, Asif Hasnain, Rohini Hallikar,"Cloud Based Intelligent Traffic System to Implement Traffic Rules Violation Detection and Accident Detection Units", Proceedings of the Third International Conference on Trends in Electronics and Informatics (ICOEI 2019) IEEE Xplore Part Number: CFP19J32-ART; ISBN: 978-1-5386-9439- 8.

[5] Helen Rose Mampilayil and R. K., "Deep learning-based Detection of One-Way Traffic Rule Violation of Three-Wheeler Vehicles," 2019 International Conference on Intelligent Computing and Control Systems (ICCS), 2019, pp. 1453-1457, doi: 10.1109/ICCS45141.2019.9065638.

[6] Ali Şentas, S. Kul and A. Sayar, "Real-Time Traffic Rules Infringing Determination Over the Video Stream: Wrong Way and Clearway Violation Detection," 2019International Artificial Intelligence and Data Processing Symposium (IDAP), 2019, pp. 1-4, doi:10.1109/IDAP.2019.8875889.

[7] M. Purohit and A. R. Yadav, "Comparison of feature extraction techniques to recognize traffic rule violations using low processing embedded system," 2018 5thInternational Conference on Signal Processing and Integrated Networks (SPIN), 2018,pp. 154-158, doi: 10.1109/SPIN.2018.8474067

[8] S. P. Mani Raj, B. Rupa, P. S. Sravanthi and G. K. Sushma, "Smart and Digitalized Traffic Rules Montioring System," 2018 3rd International Conference on Communication and Electronics Systems (ICCES), 2018, pp. 969-973, doi: 10.1109/CESYS.2018.8724086.

[9] Shashank Singh Yadav, V. Vijayakumar and J. Athanesious, "Detection of Anomalies in Traffic Scene Surveillance," 2018 Tenth International Conference on Advanced Computing (ICoAC), 2018, pp. 286-291, doi: 10.1109/ICoAC44903.2018.8939111.

[10] R. Shreyas, B. V. P. Kumar, H. B. Adithya, B. Padmaja and M. P. Sunil, "Dynamic traffic rule violation monitoring system using automatic number plate recognition with SMS feedback," 2017 2nd International Conference on Telecommunication and Networks (TEL-NET), 2017, pp. 1-5, doi: 10.1109/TEL-NET.2017.8343528.