YIDDISH Vol 13 Issue 04,Oct 2023
ISSN NO: 0364-4308

TRAFFIC RULES VIOLATION DETECTION SYSTEM

N. BABY RANI[1], N.NIKHITHA[2], N.HARSHITHA[3], N.SANKEERTHANA4, T.SAI POOJITHA[5]

[1]Assistant Professor, Department of Information Technology, Malla Reddy Engineering

[2,3,4,5] UG Students, Department of Information Technology, Malla Reddy Engineering College College for Women (UGC-Autonomous), Maisammaguda, Hyderabad, TS, India.for Women (UGC-Autonomous), Maisammaguda, Hyderabad, TS, India.

ABSTRACT:

Real time identification systems are very important and needful for safety, security rule following and socialism and also for own safety concerns. Traffic rules are important for safety as traffic laws are to prevent drivers of vehicles from causing accidents or hitting pedestrians. They are also to help control the flow of traffic so that it is more efficient. Traffic Rule Violations are leading cause of accidents, according to WHO India is a leading country in casualties occurring on road. The current system uses human interaction for rule violation detection, as it is a manual process it has some limitations, on multiple occasions we find the system gets corrupt. An alternative solution would be AI-developed System. With our system, we can detect multiple rule violations, for example, Vehicle crossing signal during red light or driving without a helmet, etc. Basic idea is to detect these violations through preinstalled cameras. We can do it by ML based algorithm where we can detect the violators by ImageProcessing, getting the number pate, categorizing violation accordingly and issuing fine. Which will help increase the efficiency of traffic rule enforcement

Keywords: ML, CNN, Perdition, GUI.

1. INTRODUCTION:

The growing number of vehicles in all crowded cities can lead to large amount of traffic which indicates that traffic violations become more dangerous all around the world. This results in the drastic destruction of property and accidents that may threaten the people. To solve the disturbing problem and prevent such immeasurable consequences, traffic violation detection systems are required. To do this,

the system invokes appropriate traffic regulations and punish people who don't follow. A detection system should be used for violation detection in real-time as the officials trace the roads and vehicles. So the traffic regulators can use this easily to maintain safe roads efficiently, as the system identifies violations with a higher speed than people. A user-friendly GUI is combined with the traffic violation system to make it easy for the users to deal with the system, track the traffic and take necessary actions against the traffic violations. This is able to identify the most usual kinds of violation. Detecting and keeping track of the vehicles and their activities effectively is the first priority of this system. 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 imagemanipulation methods for plate localization and character recognition. The SMS-based module is employed to alert the owners ofthe 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].

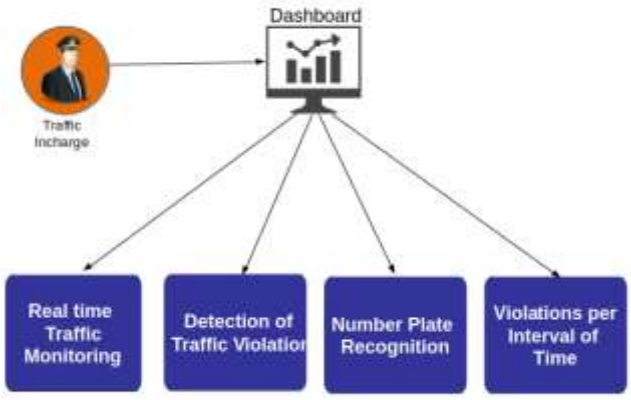
Helen Rose Mampilayil et al. [2019] This research offers a system that detects one-way traffic rule violations automatically and without the intervention of a person. Three-wheeled vehicles were taken into account because they had a higher proclivity for breaking one-way traffic laws. [5].

EXISTING SYSTEM:

The Idea of the System we have is using the infrastructure of these high surveillance systems and integrating them with Deep Learning to identify the violations. Through this System we will eliminate the human errors and system limitations. Real time identification systems are very important and needful for safety, security rule following and socialism and also for own safety concerns. Traffic rules are important for safety as traffic laws are to prevent drivers of vehicles from causing accidents or hitting pedestrians. They are also to help control the flow of traffic so that it is more efficient. The severity of different kinds of punishment depends upon the nature of the offence committed with regards to breaking traffic rules citizens have to pay the fine, serve the jail term or be banned from driving any vehicle. It detects vehicles that do not obey traffic rules, such as breaking signal, driving in the wrong direction, making illegal turns, not wearing a helmet, and other violations. Basically, due to human errors or technical errors these violators escape and sometimes there are also chances of accidents occurring.

PROPOSED SYSTEM:

A Convolutional Neural Network (ConvNet/CNN) is a Deep Learning algorithm which can take in an input image, assign importance (learnable weights and biases) to various aspects/objects in the image and be able to differentiate one from the other. The pre-processing required in a ConvNet is much lower as compared to other classification algorithms. While in primitive methods filters are handengineered, with enough training, ConvNets have the ability to learn these filters/characteristics.[6] The architecture of a ConvNet is analogous to that of the connectivity pattern of Neurons in the Human Brain and was inspired by the organization of the Visual Cortex. Individual neurons respond to stimuli only in a restricted region of the visual field known as the Receptive Field. A collection of such fields overlap to cover the entire visual area. A ConvNet is able to successfully capture the Spatial and Temporal dependencies in an image through the application of relevant filters. The architecture performs a better fitting to the image dataset due to the reduction in the number of parameters involved and reusability of weights. In other words, the network can be trained to understand the sophistication of the image better.



3. METHODOLOGY

A video footage is given as input to the system and the moving objects are detected. A detection model YOLO version3 is used to categorize the moving vehicles into particular classes. YOLOv3 is the third version algorithm in YOLO family which is used for detection of objects. It maintains the integrity of data with the use of several techniques and it is able to identify the objects more accurately. Darknet-53 architecture is used to build the classifier model. Features of vehicle classification are:

Bounding Box Predictions

Class Prediction

Predictions across scales

Feature Extractor Bounding

Box Predictions: It is a single network for real-time object detection and categorization needs to be evaluated individually but from the same convolutional region. This algorithm anticipates the fair score by means of logistic regression. Here 1 indicates the overall overlapping of bounding box on the object. It predicts only 1 bounding box prior for one ground truth object and any misconception in this process lead to both categorization and identification loss. There will be some more bounding box priors whose value may be greater than the threshold limit and less than the best value. This type of errors will only incur for the identification loss but not for the classification loss. Class Prediction: This algorithm makes use of unconventional logistic classifiers for every class in place of a conventional Softmax layer. This process is performed to convert into a multi-label classification. Every box identifies the classes that it may contain with the help of the multi label classification. Predictions across scales: For the identification of different scales, it detects boxes at three different scales. Then features can be extracted from each scale by using a method which is similar to that of feature pyramid networks. YOLOv3 gains the ability to predict at different scales using the above method. The bounding box priors which are generated using dimension clusters can be divided into 3 scales, so that there are three bounding box priors per scale. Thus there will be 9 bounding box priors as a total.

Feature Extractor: It uses a new network called Darknet-53 which consists of 53 convolutional layers, and it has more features when compared to YOLO version2. It is more powerful than Darknet -19. And its efficiency is higher than ResNet-101/ResNet-152.

The vehicles are detected using the model YOLOv3. After detection of vehicles, violation cases are checked. A traffic line is drawn by the user over the road in the preview of the given video footage. This line indicates that the traffic signal is red in that area. The objects are detected with a bounding box of green color around them. If any of the moving vehicles go ahead of the traffic line indicating the red signal, then the traffic violation happens. The color of the bounding box around the vehicle becomes red after the violation detection.

Fig.1. Home page.

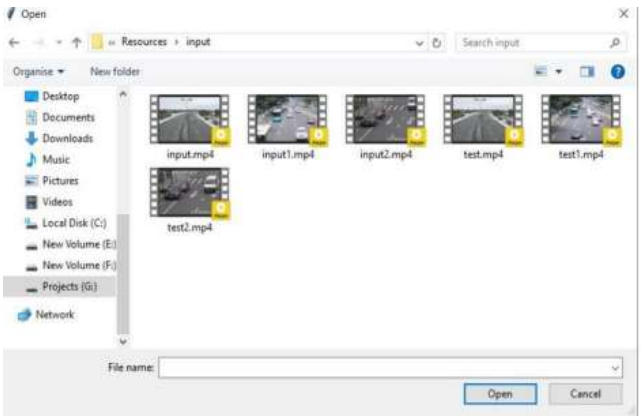


Fig.2. Input video.

Vol 13 Issue 04,Oct 2023
ISSN NO: 0364-4308

Fig.3. Vehicle detection system.

Fig.4. Driving signal line.

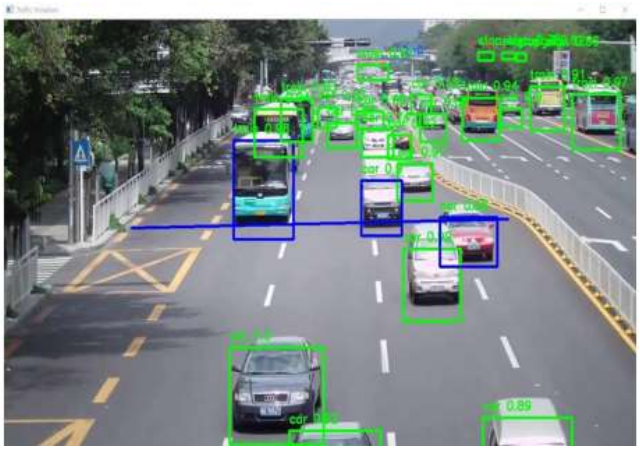


Fig.5. Vehicle classification.

CONCLUSION

If a vehicle goes ahead of the predefined traffic line on the road, it is recognized as a traffic violation. The proposed system is faster and works more efficiently than human. As we all know, traffic police is the one who captures the image of individuals violating traffic regulations but the traffic police won't be capable of detecting and capturing more than one violation simultaneously. The algorithm used here was effectively able to identify the kind of violation described here which is violating the traffic signal. The current system provides detection for traffic signal violation. Further, the system will be capable of processing a single data at a time. And also, the program has slower runtime, which can be further enhanced by using a system containing high processing speed. Further research is required for applying the existing algorithm for other high level image processing techniques as it improves the system's runtime by ignoring other unnecessary things. An OpenCV algorithm can be used in place of the existing one to enhance the performance of the system we are using now. Our further aim is to detect the number plate of the vehicle that violates the traffic signal and add more traffic violation conditions to improve the efficiency of the system.

REFERANCES

[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 Conference on 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 ThreeWheeler 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 SceneSurveillance," 2018 Tenth International Conference on Advanced Computing (ICoAC), 2018, pp. 286-291, doi: 10.1109/ICoAC44903.2018.8939111.