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Automatic Monitoring Traffic Violation Detection System

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Abstract: *The number of accidents on the roads has increased in recent times. Most of these accidents occur at highway crossings. Because, with an increasing number of vehicles on the road, manually maintaining traffic laws and regulations to keep traffic flowing smoothly is becoming increasingly difficult. At traffic signals, traffic management devices are deployed to identify cars that break the law. A system that quickly recognizes a vehicle is necessary to automate these procedures and increase their effectiveness. How can I recognize a certain car? Utilizing the car's registration plate is the straightforward solution to this problem because every vehicle has a special number that helps to distinguish it from other vehicles. The license plate of every vehicle has a unique license number that is.*

Keywords: Optical Character Recognition (OCR), Yolov4, xampp, Tomcat server

I. INTRODUCTION

Exclusive to that nation. This number Since the authorities constantly monitor the roads, a real-time traffic violation detection system is required. Therefore, Since the traffic detection technology collects infractions faster than people, traffic enforcers may adopt safe pathways precisely and effectively. Violations of the traffic signal can be detected by this system quickly. By combining Yolov4 with Keras OCR, an automated system can recognize a vehicle's license plate and Keras OCR extract its numbers You Only Look Once is referred to as YOLO. A number of objects can be recognized by the real-time object recognition system in a single frame. Compared to previous recognition systems, YOLO detects objects more quickly and accurately. Up to 9000 classes, as well as unexpected classes, can be predicted. Multiple objects will be selected from an image by the real-time recognition system, which will also draw a border box around each object. It is simple to deploy and train in a production system. YOLO implicitly encodes contextual information about classes in addition to their appearance because it sees the complete image during training and testing. Hence, facilitating the detection of the license plate. The keras OCR recognizes characters and extracts numbers from the license plate. find out of more information about the car and its owner by using the license plate number. After getting information of vehicle owner details and matching vehicle number from database then extracts his phone number from database and sends him an SMS informing him of the penalty.

II. LITERATURE SURVEY

Various model classification methods for automated traffic violation detection systems have been proposed in recent years. This section describes the various techniques discussed in the following papers that are used in traffic violations
According to ayush Srivastava et al., (2021), number plate recognition is accomplished by uploading images from the front or back of a vehicle and then processing the image for identification of the vehicle license plate. There are three basic stages, which are as follows: First off, locating and identifying a license plate in this segment improves the scene's visuals throughout processing. The second step is to separate the identified numeric plates from the character segmentation characters in order to retain the valuable information for future processing. In the third step, OCR is used to convert the text into encoded text data [1].
Shreya Asoba et al., (2021) This advanced traffic management method makes use of RFID, which comes pre-installed in vehicles and stores unique IDs for owners and vehicle details in an orderly database of all registered vehicles that was created using MySQL [2]. RFID tags, RFID detectors, image processing, and GSM are all instances of RFID systems. Furthermore. The vehicle is recognized and its license plate is identified using image processing technology, which is

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simulated and confirmed using a real digital image in Python. Any vehicle that attempts to cross a red signal will reach the reader's RF zone at the moment the RFID reader scans the tag and gathers image processing information, directing it. Roopa Ravish et al., (2021) In this paper, we propose the YOLOv3 (You Only Look Once version3) method to detect traffic violations [3]. This algorithm uses Darknet-53 as a feature extractor and Convolutional Neural Networks (CNN) to recognize objects. YOLOv3's main benefit is that it clusters the input dataset using clustering analysis to increase prediction accuracy, even for small vehicles.

Nizza, A.R.M et al., (2021) Image Processing, Internet of Things, Artificial Intelligence, Traffic Violation, Intelligent Transportation System The main components of the proposed system are shown below [4]. The main hardware units, sensors, actuators, additional hardware peripherals, and system software needs can all be classified as system components. The results demonstrate that the design is practical for automating traffic fines for speeding at a reasonable cost. Furthermore, it is advised to utilize a more reliable technique to record the real-time speed of any fast-moving vehicle. The Raspberry-Pi Foundation developed the credit card-sized Raspberry-Pi Single Board Computer (SBC), which is based on the ARM architecture.

Shreyas et al. (2017) developed a method to automatically recognize the number plates of vehicles. When traffic laws or signals are violated [5], the system automatically recognizes the violating vehicle's license plate and sends an SMS with information on the penalty. This system was developed with the use of image processing technology. Optical character recognition technology is used for number plate recognition. This system can also be used to find stolen vehicles. They have developed a system that could satisfy 80% of the purposes.

III. PROPOSED METHODOLOGY

The traffic velated any vehicle images are first captured and then the number plate area is detected. but in this case, as we are using an object detection model YOLOv4 is used. YOLO (You Only Look Once) family is YOLOv4. It improved accuracy. Recognition and keras-ocr using character recognition step. The measurement procedures that will be used are

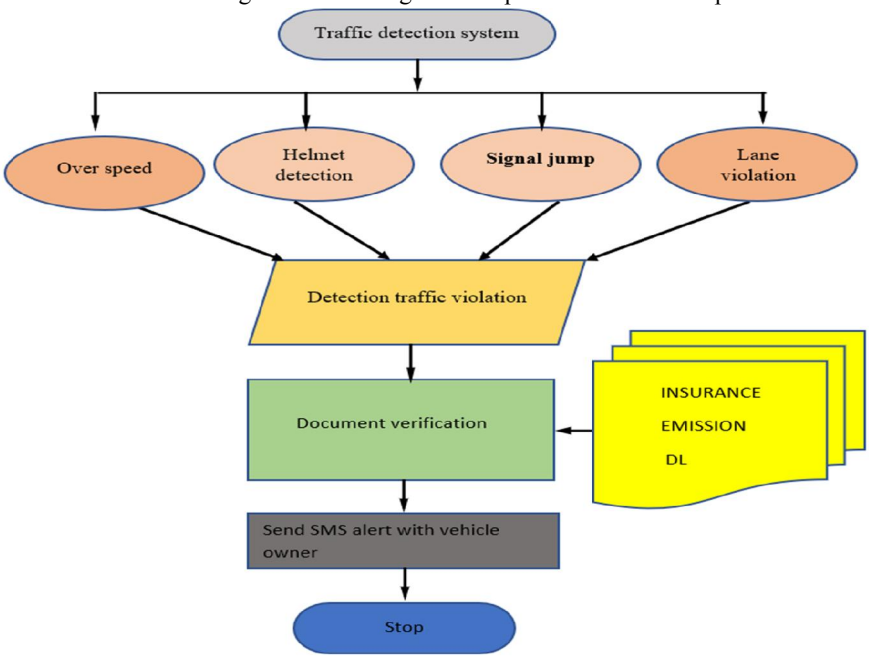

Figure 1 System flowchart

3.1 Traffic Violation Detected

The YOLOv4 model is used to detect the vehicles. The cases of violations are evaluated when the cars have been found. The line clearly states that the light is red. Any car that crosses the traffic line in a red state is breaking the law. A violation occurs whenever a car crosses the intersection during a red light. The bounding box surrounding the car becomes red when a violation is detected.

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3.2 Yolov4 and Detecting License Plate

Yolov4 is an object detection model. Normally, object detection models are trained to look for a particular set of object classes in an image. These object classes are identifiable by their class and are contained within a bounding box. Yolov4 is a one-stage object detection model

In contrast, a two-stage detector use an initial step to determine locations of importance are recognized, and then is classed to check if the item has been detected in these areas

3.3 Character Recognition

The next phase after training the dataset of images and detecting the license plate is to apply pre-processing techniques i.e., grey scaling thresholding using Otsu's method and segmentation:

3.4 Cropping the license plate from the bounding box

Taking the bounding box coordinates from the YOLOv4 detection phase, the first stage of the procedure is to simply take the sub image area within the bounds of the box.

Figure 2. Resized image of license plate

3.5 Gray scaling

Gray scaling's importance is in dimension reduction; for example, where RGB pictures have three dimensions and three-color channels, grayscale images only have one. Gray scaling

Figure 3. Convert the image to grayscale

3.6 Thresholding

The image is thresholder to Finding the contours of an image is done faster by white text on a black background and white text on a black background

Figure 4. image after thresholding process

3.7 Application of contours and segmentation

We now use OpenCV properties in Python to apply contours in the form of rectangular boxes around the characters and sort them left to right.

Figure 5. The rectangular boxes form only character

The individual of the license plate number segmentation and the The last step is to add a little median blur to the image's characters before sending them to keras-ocr, which will extract the letter or number from it.

Figure 6. Segmented characters of the image

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3.8 Send SMS Vehicle Owner

In this system send SMS to vehicle owner why because if any violation happens and vehicle crosses the traffic line in a red state You can find out of more information about the car and its owner by using the license plate number, after recognizing the owner of the vehicle, it extracts his phone number in database and sends him an SMS informing him of the penalty.

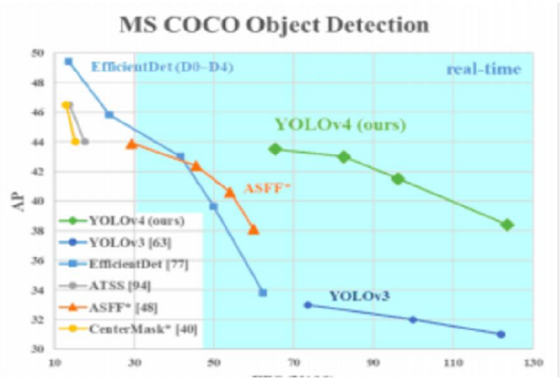
Figure 7. Sending SMS Mobile

Algorithm: Handling of traffic violation

```
1.  Input: captured image
2.  Output: SMS alert
3.  if traffic_violation (img) = true then
4.      plate=detect-plate(img)
5.      Step 1: convert-grayscale(img)
6.      Step 2: extract rectangle with black background and white text
7.      Step 3: extract number(img)
8.      num=recognize-number(plate)
9.      Mobile=fectch-mobile-num(num) // match found from database
10.     amt=send-msg-alert(mobile)
11.     print (penalty SMS send for vehicle owner)
12. Else
13.     Print ("no traffic violation")
14. End if
```

IV. RESULTS AND DISCUSSION

The simulation results of the suggested system are shown in this section. Red signal violation Images with a resolution of 800 x 600 pixels are captured. It first identifies the number plate, then it converts to grayscale and segmentation, and the vehicle number is extracted from the plate. then fetches the vehicle owner details from the database. After recognizing the owner's details, it extracts his phone number and sends him an SMS informing him of the penalty YOLOv4: Speed and Accuracy of Object Detection



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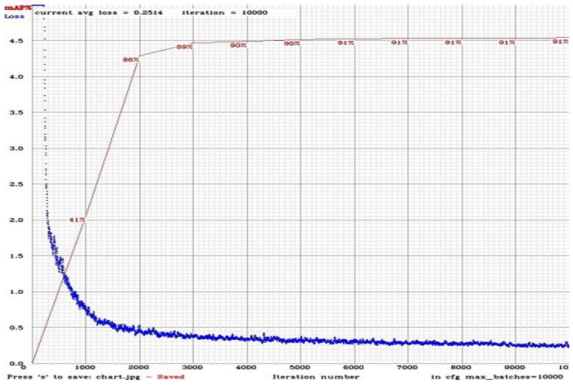
The suggested YOLOv4 is compared to various cutting-edge object detectors. With equivalent performance, YOLOv4 runs twice as quickly as Efficient. increases AP and FPS in YOLOv3 by 10 and 12 %, respectively.

To train our unique object identification model for a single object, a number plate, we collected the dataset from Open Images and utilized YOLOv4. Here is a graph showing loss and Mean Average Precision (MAP).



As you can see, we got a MAP of around 91%, which is close to that of the human eye. The model's accuracy for testing under typical conditions was 98 %, and its confidence in detecting the number plate was more than 80 %. When removing unnecessary plates from a frame, we might use a threshold of 0.8.6.

V. CONCLUSION

By suggesting a strategy for heart disorder/ailment diagnosis through machine learning approach, fully utilized diagnosis can be obtained; the findings revealed a high precision standard for providing a superior assessment result. Well organized classification of healthcare dataset is a major machine learning problem then and now. Data mining techniques with the patient dataset and ECG signal classification helps in the detecting heart related abnormalities and diseases precisely (Above 80%). Depending on the type of input, we can also use sound signals for classification, which returns different types of heartbeats.

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