International Journal of Scientific Research & Engineering Trends
Volume 6, Issue 2, Mar-Apr-2020, ISSN (Online): 2395-566X

Speed Detection Violation Deterrent

keval Patel, Yash Patel, Hardik Patel, Prudhvi Krishna, Guide Janvi Patel
Dept. of Computer Science and Engineering
Parul University Vadodara

Abstract **–Road accidents have been very common in the present world with the prime cause being the careless driving. The necessity to check this has been very essential and different methods have been used so far. However, with the advancement in the technology, different governing bodies are demanding some sort of computerized technology to control this problem of over speed driving. At this scenario, we are proposing a system to detect the vehicle which are being driven above the given maximum speed limit that the respective roads limits. A complete violation detection system using python and TensorFlow.**

Keywords **–TensorFlow, tkinter, Faster RCNN, Open ALPR.**

I. INTRODUCTION

Over speeding vehicles are major issues for road safety and needs proper addressing to minimize the accidents. Excessive Speed is a factor in half of all fatal crashes. Speed detection violation deterrent system to detect the vehicle which are being driven above the given maximum speed limit that the respective road limit. A system that automatically capture over speed vehicle and send traffic ticket to the over speeding person. A proposed system captures real time speed of vehicle and check for over speeding, number plate in an automatic way.

II.OBJECT DETECTION

Object detection deals with different class like animals, humans, vehicles, ball, etc. It can be done by learning special features of each objects.

1. TensorFlow object detection API

It is open source api of TensorFlow in which there is pretrained objects or create and train object to implement object detection module. Because it is difficult to make models from scratch and also time taking.

2. Faster RCNN for object detection

Faster RCNN use Region Proposal Network (RPN). As RPN means it is a network to propose region. For instance, after getting the output feature map from a pre-trained model (VGG-16), if the input image has 600x800x3 dimensions, the output feature map would be 37x50x256 dimensions. Explanation in fig [1]

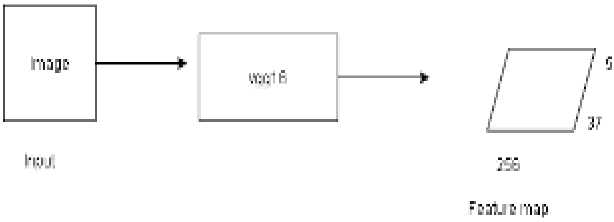


Fig.1. Faster RCNN.

Each point in 37x50 is considered as an anchor. We need to define specific ratios and sizes for each anchor (1:1, 1:2, 2:1 for three ratios and 128^2, 256^2, 512^2 for three sizes in the original image). Fig [2]

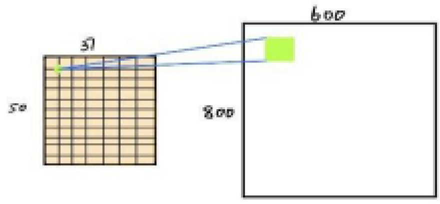


Fig.2. Anchor projected to original photo.

Every anchor has 3x3 = 9 corresponding boxes in the original image, which means there are 37x50x9 = 16650 boxes in the original image. We just choose 256 of these 16650 boxes as a mini batch which contains 128 foregrounds (pos) and 128 backgrounds (neg). At the same time, non-maximum suppression is applied to make sure there is no overlapping for the proposed regions.

RPN is finished after going through the above steps. Then we go to the second stage of frcnn. Similar to Fast R-CNN, ROI pooling is used for these proposed regions (ROIs). The output is 7x7x512. Then, we flatten this layer with some fully connected layers. The final step is a SoftMax function for classification and linear regression to fix the boxes' location. Shown in Fig [3].

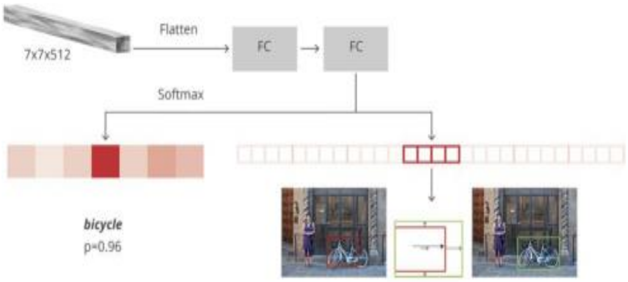


Fig.3.Architecture of Faster RCNN Source: https://tryolabs.com/blog/2018/01/18/faster-r-cnn-down-the- rabbit-hole-of-modern-object-detection/.

III. SPEED AND LABELLING VEHICLE

For speed, we have use simple formula i.e.
S= final position- initial position/60. So in our project we use enter time – exit time/60. Enter time means vehicle enter in video frame and Exit time means vehicle exit the video frame. That's how speed is calculated.
There is a three label in our GUI application made of tkinter. Shown in fig [4]

1. Blue tklabel is for last position of video frame
2. Red tklabel is for predicted point of object.
3. Green tklabel for test point of video frame.

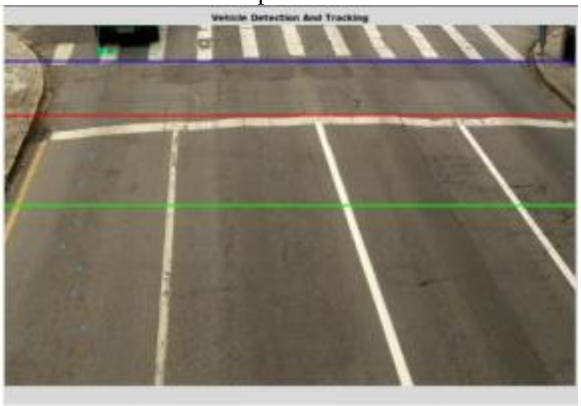


Fig.4. tklabel in GUI Application.

IV. LICENSE PLATE DETECTION

For making vehicle violation system it is hard to implement system which detect license plate in every condition i.e. speeding car, low light, background extraction all this deals with extraction of license plate.

1. Open Alpr Api

For automatic license plate recognition, we are using Open

V.SYSTEM DESIGN

The system consists of three modules, namely objection detection, speed detection and license plate recognition. Also include label map, speed calculation, image processing, violation detection, evidence storing. Shown in fig [5]

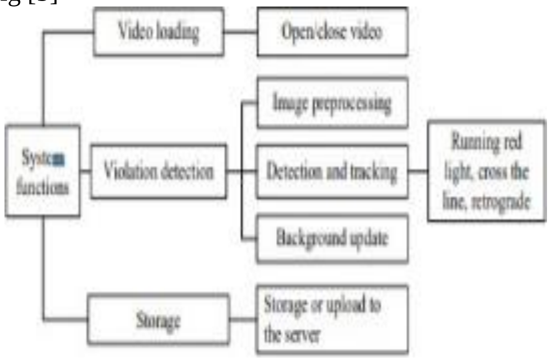


Fig .5. System flowchart.

System is developed in python in Spyder (python platform) and TensorFlow and OpenCV library.
OpenCV contains image processing functions. We use to load video in app using OpenCV. Firstly, there is a creation of GUI application using tkinter. Then assign tklabel as explain earlier. Then enabling TensorFlow environment for vehicle detection.
TensorFlow object detection API is use for vehicle detection and Faster RCNN in our system. There is common function in TensorFlow used in our sytem.

- checkredlightCrossed ( ) : Use to detect violation of red Light.
- matchVehicles( ) : Use to calculate vehicle width and height.

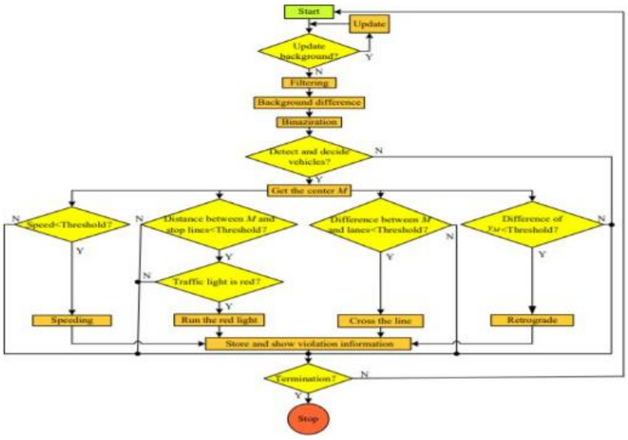


Fig .6.Vehicle Violation detection.

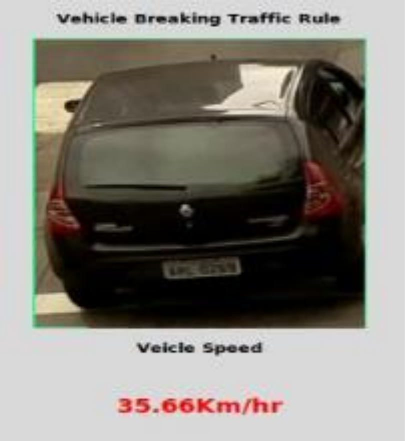
VI. RESULTS

Rate of automatic speed detection and multiple checkSpeed () : use to calculate speed of vehicle using initial and exit point of vehicle in video frame.
Label_map : Assign id to vehicles in frame.

TensorFlow object models are used to detect vehicles from pretrained samples that are available in TensorFlow object Detection API. After that speed detected for each vehicles. Then using Open ALPR license plate for each Vehicles is recognize.
Then system is go for violation detection for crossing red light and over speeding. After founding Violation that violation is stored in system.

The procedure of violation detection is given in Fig. 6. As shown in Fig. 6, the system includes image processing, vehicle tracking, violation identification and information storage. The most important step in image processing is background update. We propose a real-time automatic algorithm to improve vehicle detection using TensorFlow. detection of vehicle is effectively stable and working absolutely fine.

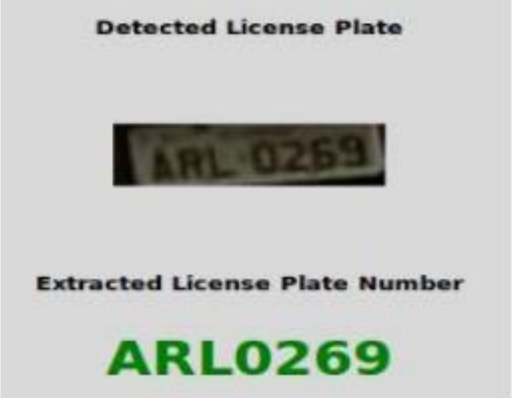
There is some rate of error in license plate. But for object detection, there is no error. Violation detection is able to capture all violations. Shown in Fig (A & B)


Vehicle Breaking Traffic Rule

Veicle Speed

35.66Km/hr

Fig .A.Vehicle violation capture and speed calculation.


Detected License Plate

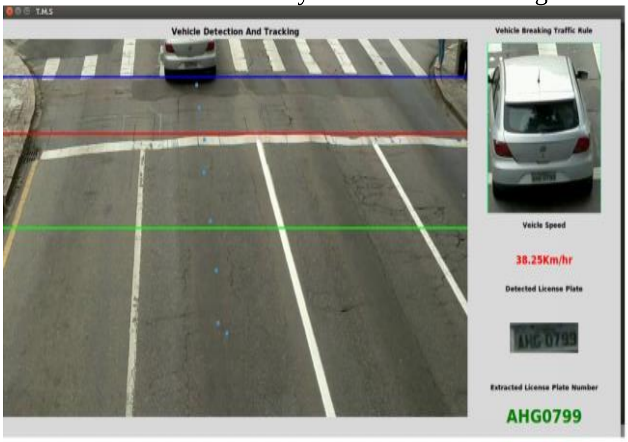
Extracted License Plate Number

ARL0269

Fig .B. License plate extraction using Open ALPR.

VII. CONCLUSION

We have a developed a system that can automatically capture speed and violation of vehicle. It can be used as Intelligent traffic management system. Using different method of TensorFlow function and real-time capture of violation enables accurate system for traffic management.



Vehicle Detection And Tracking

Vehicle Breaking Traffic Rule

Veicle Speed

38.25Km/hr

Detected License Plate

Extracted License Plate Number

AHG0799

Fig .7.Results of Speed violation deterrent system.

REFERENCES

[1]. Seibel, H., Goldenstein, S., & Rocha, A. (2017). Eyes on the target: Super-resolution and license- plate recognition in low-quality surveillance videos. IEEE access, 5, 20020-20035.

[2]. Liyanage, H. K. P., & Maheta, V. D. (2017, May). License Plate Number Extraction Using MATLAB. In 2017 9th IEEE-GCC Conference and Exhibition (GCCCE) (pp. 1-9). IEEE

[3]. Tejas, B., Omkar, D., Rutuja, D., Prajakta, K., & Bhakti, P. (2017, June). Number plate recognition and document verification using feature extraction OCR algorithm. In 2017 International Conference on Intelligent Computing and Control Systems (ICICCS) (pp. 1317- 1320). IEEE.

[4]. Kulkarni, P., Khatri, A., Banga, P., & Shah, K. (2009, April). Automatic number plate recognition (ANPR) system for indian conditions. In 2009 19th International Conference Radioelektronika (pp. 111-114). IEEE.

[5]. Ismail, M. (2017, November). License plate Recognition for moving vehicles case: At night and under rain condition. In 2017 Second International Conference on Informatics and Computing (ICIC) (pp. 1-4). IEEE.

[6]. Jennehag, U., Forsstrom, S., & Fiordigigli, F. (2016). Low delay video streaming on the internet of things using Raspberry Pi. Electronics, 5(3), 60.

[7]. Rohadi, E., Suwignjo, S. A., Pradana, M. C., Setiawan, A., Siradjuddin, I., Ronilaya, F., ... & Ariyanto, R. (2018, October). Internet of Things: CCTV Monitoring by Using Raspberry Pi. In 2018 International Conference on Applied Science and Technology (iCAST) (pp. 454- 457). IEEE.

[8]. M. Takatoo, T. Kitamura, Y. Okuyama, Y. Kobayashi, K. Kikuchi, H. Nakanishi & T. Shibata, Traffic flow measuring system using image processing. Proc. SPIE, 1989, Vol. 1197, 172-180.

[9]. R.R. Goldberg & M. Roth, Parallel algorithms for real time tracking. Proc. SPIE, 1996, Vol. 2908, 167-174.

[10]. M. Betke, I. Haritaoglu & L.S. Davis, Multiple vehicle detection and tracking. Proc. SPIE, 1997, Vol. 2962, 104-110.

[11]. M. Fathy & M.Y. Siyal, An image detection technique based on morphological edge detection and background differencing for real-time traffic analysis. Pattern Recognition Letters, 1995, Vol. 16, 1321-1330.

[12]. B.K.P. Horn & B.G. Schunck, Determining optical flow. Artificial Intelligence, 1981, Vol. 17, 185-203.