



iJRASET

International Journal For Research in
Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 8

Issue: III

Month of publication: March 2020

DOI:

www.ijraset.com

Call:  08813907089

E-mail ID: ijraset@gmail.com

Smart Traffic Fine Due Detector

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Abstract: *With increasing number of vehicles on road, it is getting difficult to manually monitor the traffic for smooth traffic flow. Traffic Management system are installed at traffic signals to check the vehicles breaking the traffic rules. In order to automate this process and make it more effective, a system is required to easily identify a vehicle. A particular vehicle can be easily recognized through its license number plate. An automated system can be implemented to identify the license plate number of a vehicle and extract the characters and numbers from the region containing a license plate. An automated system should be small in size and should be able to process data at sufficient rate. Initially the number plates are scanned and that data is sent to optical character recognition (OCR) model. OCR model converts image into plain text format and the extracted data is mapped with the predefined data present in the database. If the data matches then it is sent to the dashboard of an on duty cop. Further processing is done by cop itself. OCR is the most active and interesting evaluation of text cum character processing recognition and pattern based image recognition. The proposed system is used to identify the vehicle breaking the traffic rule, when the signal is red.*

Keywords:- *Image Processing, Traffic Automation, Optical Character Recognition, Firebase, Cross Platform, OpenCV, Flutter, Python.*

I. INTRODUCTION

In this paper, an automated system has been proposed which solves the problem of manual monitoring of vehicles. In every metropolitan cities vehicles are increasing, due to which traffic offenders are also increasing. Offenders are not paying their fine over the months and years. Thus an automated vehicle recognition system is being proposed to handle this task efficiently.

Every vehicle is having its unique license number by which it can be differentiated from the other vehicles. So when the vehicles are stopped over the red signal, number plate of the vehicle is scanned using camera or manual scanning of license plate is done by the cop using scanning device. The license plate number is a key to retrieve more information about the vehicle and its owner. Automatic license plate recognition method consist of three segments: Character segmentation, Optical character recognition and template matching. The main objective of the proposed design is to detect a license plate number from camera and convert it to the text using OCR algorithm. Extracted data is sent to the database and compared with the data to get the details of the vehicle owner. Details are sent to the on duty cop and fine is allocated and collected.

II. RELATED WORK

Hanit Karwal et.al has stated the three basic modules in Vehicle Number Plate Detection (VNPD) System for Indian vehicles namely image pre-processing, candidate area extraction and character recognition[1]. In pre-processing module, loading of image is carried out to convert it in gray or binary form, followed by some de-noising techniques. In candidate area extraction, number plate area is detected and segmentation of characters is carried out. In character recognition, template matching is carried out and retrieval of characters is performed. The algorithm used modified Otsu's method for threshold partitioning. By maximizing the correlation between the templates, scale variance between the characters was reduced. An algorithm is proposed to cope with scale variance by using template matching with Normalized Cross Correlation[1].

R Shreyas et.al has given an algorithm for Automatic number plate recognition system using OCR which is carried out by using following steps:-Input image from web cam; Convert image into binary; Detect number plate area; Segmentation; Number identification; Save the file in given format[2]. MATLAB code and GSM module is used to send the SMS of penalty to the owner of vehicle.

Santosh Kumar Henge et.al has expressed two important objectives; the first is the detail study and analysis of various character recognition methods and approaches like flow and type of methodology or approach used, type of technology and algorithm implemented background of the proposed methodology, invention flow for the best outcomes of the each methodology. The second main objective and ideology of various OCR algorithms like neural networks algorithm, structural algorithm, support vector algorithm, statistical algorithm, template matching algorithm along with how they were classified, identified, rule formed, inferred for recognition of characters and symbols.

Er. Kavneet Kaur and Vijay Kumar Banga has evaluated the accuracy of the OCR technique by template matching. Evaluation resulted in some factors which affect the effectiveness of template matching based on OCR technique i.e. font type, noise in image, tilting[5]. The comparison between edge detection methods like :- Canny edge detection, Sobel edge detection, Prewitt edge detection, Log edge detection is carried out. After evaluation they concluded that canny edge detection is far better than other detections[6].

Parveen Kumar et.al have worked on Handwritten Character Recognition and concluded that, it is possible using SVM's. Of the several neural networks architectures used for classifying the characters, the one with two hidden layers, having 200 neurons in first hidden layer and 100 neurons in second hidden layer has been found to yield the highest recognition accuracy of 80.96%[8].

III. PROCESSING STRATEGY

It is a formal representation of a system organized in such a way that supports reasoning about the structure and behavior of a system. The following diagram represents the structural view of processing of the project. Requirements and analysis can be carried out from the structural view of the project.

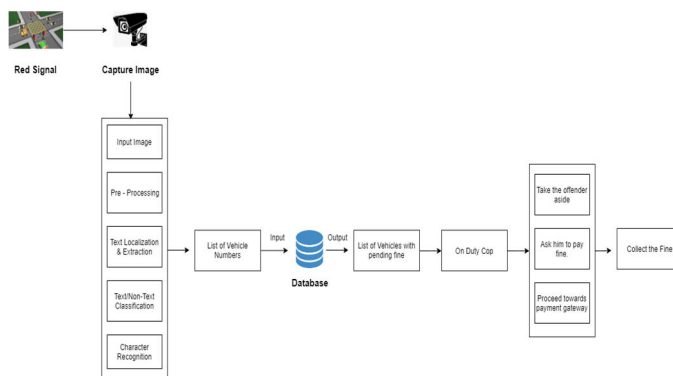


Figure 1: Architecture of smart traffic fine due detector

In computer science, using digital image processing via computer algorithms, image processing on digital images is carried out. As a field of digital signal processing, digital image processing has many advantages over analog image processing. In this proposed system an input image will be given to algorithm which was taken by CCTV camera. The algorithm will extract text from number plate. Once the algorithm extracts text from input image, then we will get the list of vehicle numbers standing on red signal. This list will prove important as we are giving these numbers as input to database to fetch previous fine.

For the proposed system we are going to use Google Firebase as database. Real time database and backend as a service are provided by Firebase. Firebase provides application developers an API which allows application data to be synchronized across clients and store on Firebase's cloud. Libraries that enable integration with Android, iOS, JavaScript, Java, Objective-C, Swift and Node.js applications are provided by the companies to the clients. The database can be accessed through a REST API and bindings for several JavaScript frameworks such as AngularJS, React, Ember.js and Backbone.js. The Server-Sent Events protocol is used by the REST API for creating HTTP connections to receive push notifications from a server. As we got the list of vehicles standing on red signal through image processing, that list will go as input to database to check whether any fine is pending on individual vehicle or not. If fine is pending on that vehicle then another list will be generated of vehicles standing on signal with Pending Fine. The generated list is sent to the on duty cop. The cop will take the offender aside and ask him to pay the fine. Or else the fine gets allocated to the offender by sending the SMS to the offender.

IV. MOTIVATION

It has been observed that traffic department has an abundance of workload like monitoring the traffic as well as checking the pending fines of offender. This is a time killing process and due to this the traffic department revenue is decreasing.

V. CONCLUSION

Manual control of traffic was getting an issue. To overcome this problem an automated system is being created. This paper gives the description of an automated system. This module provides an easier solution for collecting fine. The system is efficient and can sustain for long without failure. Due to this automated system, traffic cops load is reduced.



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