Extraction of Vehicle Number Plate using Recurrent Neural Network for Security Aspect

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ABSTRACT:- *The use of vehicles rising exponentially due to population growth. Automatic number plate reader system used for effective control of security system. Automatic number plate reader system is an image processing technique that identifies the vehicle number plate without human involvement. It is a computer system that recognizes automatically any digital image on the number plate. The objective of this system is to design and develop effective image processing techniques by localizing the identification plate in the captured image and identify the characters using Recurrent Neural Network algorithm. This system is further designed to detect the unauthorized license plates along with the duration of the arrival of unlicensed vehicles. The details such as name of the owner, contact number, address, and aadhaar number of the owner would be displayed. This has been implemented by using Recurrent Neural Network in Python 3, Anaconda Prompt environment. Applications of this system are security control of highly restricted areas, highway speed detection, discovery of stolen cars, automatic fee collection systems.*

Keywords: **Automatic Number Plate Reader System, Image Processing technique , Python 3, Recurrent Neural Network algorithm, Anaconda Prompt environment**

1. INTRODUCTION:

The use of Vehicles increasing throughout the country[1].Traffic regulation and vehicle owner's tracking has become complication in every nation. Automatic number plate reader system plays important role in traffic control. The ANPR system is used in the field of security to assist the authorities in identifying the unauthorized cars. It identifies the unauthorized cars along with date and time of the car arrival. It displays the details i.e., Name, Contact Number of the identified car. This system is an application of image processing that allows one to extract number plate information from image [2].Each vehicle has an identification number. The identification number is the license number that needs to be installed on the vehicle. The identification number holds the details of the owner of the vehicle. This identification helps with safety, highway speed detection, and unauthorized vehicle detection. The automatic vehicle identification number involves mainly two steps; they

are finding the registration plate of the vehicle and recognizing the characters on the plate. The steps involved to localize number plate from the detected car image are Conversion of RGB to gray scale image[4], removal noise with bilateral filters, Histogram equalization, morphological opening with a structured element, Image subtraction, Thresholding the image, apply canny edge detection[3], Dilation[2], Finding contours based on the edges. For identifying the characters on the number plate, a Recurrent Neural Network is used. The applications of automatic number plate reader system are highway toll collection, parking area of shopping malls, hospitals, airports. These systems are highly preferable in current traffic control system.

2. RELATED WORK:

In [1] the k nearest algorithm is used to recognise the characters. Threshold technique like adaptive Gaussian threshold is applied on the input image.

In [2] the captured image is preprocessed with various techniques. Morphological image techniques and edge detection are used for plate localization. The character segments are matched with the templates of database

In [3] the Canny edge detection technique is used for plate localisation. The characters from A to Z and the numbers from 0 to 9 are trained initially. The segmented characters are compared with trained characters.

In [4] Diverse image processing techniques and calculations are used to construct programmed vehicle plate reader system to identify vehicle plate range from an image or a video.

In [5] Ant Colony optimization used in plate localization and SVM is used for individual character recognition.

In [6] the smearing and morphological algorithms are used to segment the characters and segmented result is normalized. The character identification is performed by template match algorithm.

In [7] the segmentation of grey image produced by finding edges, Hough transform is used.

3. PYTHON:

Guido Van Rossum developed the coding language. This language is Compatible for large and small projects. According to the complexity, the version changes. Python version 2 was released in 2000 with new features Python version 3 was released on 2008.Many of its major features were back ported to python 2.6x and 2.7x version series. It holds large standard library, cited as one of its greatest strength. Suited tools are provided to perform tasks. In general, python has more functionalities than MATLAB [1].In Tiobe Coding Community Index, python stood in tenth position. It is found that scripting languages like Python are efficient than traditional languages like C programming and java. The memory storage is often more better than C and C++.It is simple to handle some code to model the idea of processing your images[1].Now a days many reputed organisations uses python language. The coding is achieved in less number of lines compared with the existing languages. Complexity is low in python. It can be accessed through Open CV or using anaconda prompt

4. EXISTING METHOD:

Many developed countries in the world are using automatic number plate reader system practically. Those countries strictly use standard features for number plate such as: dimensions of a panel, borders of a panel, colour of the panel and colour of the characters such that they can be easily localized. In India, Vehicle plate standards are rarely followed. There are wide variations in text font, text size, colour of the number plate and characters. The Indian Vehicle plates do not follow specific features to support recognition. Thus, automatic number plate reader system is hardly found in some cities of the countries. Mostly manual recordings are in use and automatic number plate systems are not commercially implemented.
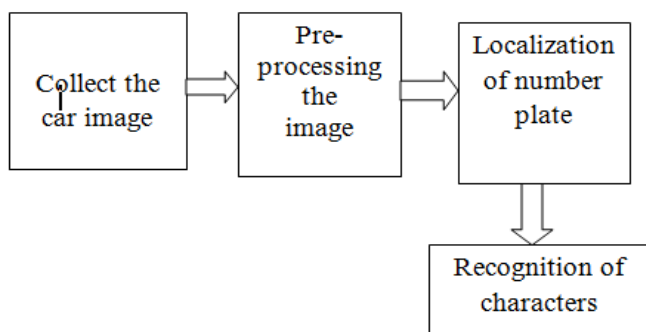
5. PROPOSED METHOD:

Figure (1): Block diagram of the system

5.1 CAPTURE THE CAR IMAGE:

A high intensity camera is used to record the car picture as the efficiency of the recognition of characters rely on the recorded picture. Thus, normal cameras with low pixel are not suited for Automatic Number Plate Reader System.

5.2 PRE-PROCESSING:

The captured RGB image is changed into gray image to decrease the complexity of a picture. The three layers of picture is reduced to one layer of a picture.

5.3 LOCATING THE LICENSE PLATE:

Number plate tracing is achieved by masking the part other than the Vehicle plate. Initially take an empty black image. Then draw the contour of Vehicle plate on the black image. This is the mask. Take bitwise AND with the original picture so we can just get the Vehicle Plate from the original picture.

5.4 RECOGNITION OF CHARACTERS:

The characters on the registration plate must be equivalent to the trained characters. If the trained characters are not equivalent to the detected characters then the recognition fails. If the trained characters equivalent to the detected characters then the text appears in the output. Recurrent Neural Network is used for character classification and recognition to train the samples.
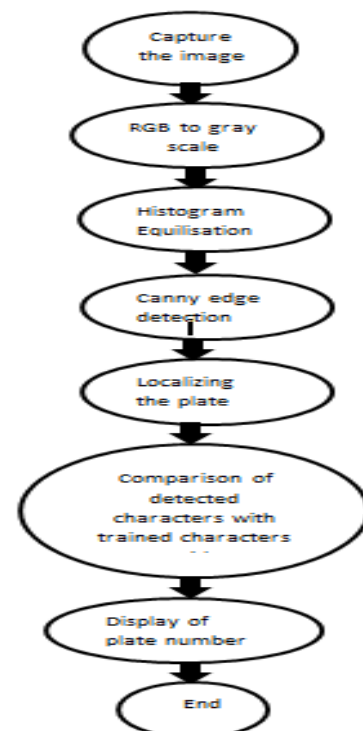

Figure (2): Flow chart of proposed system

5.5 NUMBER PLATE RECOGNITION FOR SECURITY ASPECT:

Excel database: Initially, The valid and invalid numbers of vehicle plate is saved in a database along with date and time. In Python, software is used as an Automation client and the MS office Excel sheet program as the server. Secondly, an alert message is displayed in case of an unauthorized vehicle. Thirdly, the details of the car owner such as name, contact number, address of the owner, aadhar number are displayed. This is mainly used to detect stolen cars.

6. RESULTS:

Figure (1): Original image

Figure (2): Gray scale image

Figure (3): Bilateral filtered image

Figure (4): Histogram equalisation

Figure (5): morphological operations

Figure (6): Image subtraction
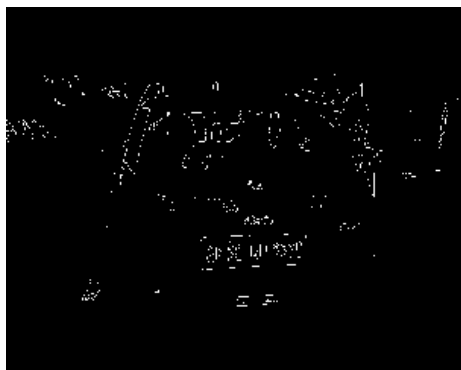

Figure (9): Detected plate
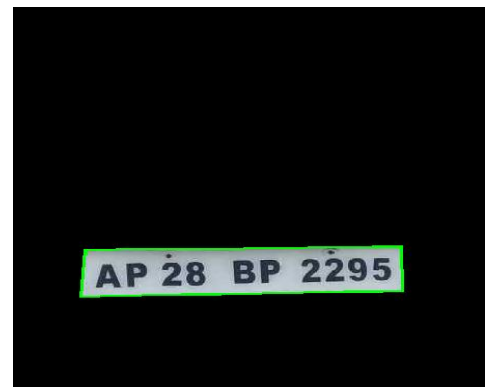

Figure (7): Thresholding the image

Figure (10): Cropped image of plate

Figure (8): Canny edge detection

Figure (11): Number of the plate along with date and time in excel sheet

Figure (12): An alert message

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AUTHORISED VEHICLE NUMBER- HR26 BP3543
AUTHORISED VEHICLE NUMBER- HR26 DP3543
UNAUTHORISED VEHICLE NUMBER- HR26 CP3543
AUTHORISED VEHICLE NUMBER- HR26 EP3543
AUTHORISED VEHICLE NUMBER- wR26 EP3543
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Figure (13): Display of authorised and unauthorised numbers

Figure (14): Display of unauthorised plates with date and time

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details[x]

('VIJAYA', 'AADHAR NUMBER', 'contact number', 'ADDRESS')
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Figure (15): Display of detected car along with details of the owner

7. CONCLUSION:

License plate can be extracted well using neural networks. Detecting number is insufficient for blur and dark images. Different algorithms could be used to extract the number.

8. REFERENCES:

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