Automatic License Plate Recognition Using Computer Vision for Door Opening

P. Jayalakshmi and Mr. T. Rajesh Kumar

***Abstract* – Sliding window analysis basically used in image processing applications. RUCV technology is used to identify the license plate number of vehicles. It is difficult to detect the alpha numeric characters and numbers from a car image. This paper proposes the system of identifying license plate numbers of Indian cars. It ties to recognize the entry of authorized and unauthorized vehicles. The system can be implemented in apartments for safety purpose. The proposed algorithm consists of three major parts vehicle detection, number plate identification, character recognition, vehicle arrival time. The system is implemented using Mat lab.**

***Index Terms* - Edge detection, Median filter, Template matching.**

I. INTRODUCTION

The growth of technology is increasing day by day to fulfill the human needs. The proposed system is implemented to make human work easier. RUCV is an image processing technology which uses license plate to identify the authorized vehicle license plate number and alpha numeric characters. The objective is to design an efficient automatic authorized vehicle identification system by using the vehicle license plate. The system can be implemented in apartments. The alpha numeric characters are recognized by using template matching. The resulting data is then used to compare template so as to come up with the specific information like the vehicle's owner, license plate number and time of arrival, etc.

Edges typically occur on the boundary between two different regions in an image. Various physical events cause intensity changes such as geometric events and non geometric events. There are several classical edge detection techniques such a Roberts, Prewitt, Sobel and Canny. By using these techniques the longer edges are not accurately detected.

To overcome these issues medfilt2 filter is used to remove the salt and pepper noise. A median filter is more effective than convolution when the goal is to simultaneously reduce noise and preserve edges. Global threshold that can be used to convert the intensity image in to a binary image.

In this paper, several LPR methods have been examined to assess their license plate number and more robust to classify the white and yellow colored plates. Finally it detects the nature the number.

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II. RELATED WORK

Several approaches have been proposed in literature for vehicle license plate recognition. Most algorithms in literature deal with the recognition problem in two separate stages: license plate detection for finding the location of the plate, and license plate recognition for extracting and recognizing the individual characters.

Rob G. J. Wijnhoven, Member, IEEE and Peter H. N. de with, Fellow [1] have proposed the Automatic garage door opening is typically implemented by use of a radio receiver and transmitter. When arriving in the neighborhood of the garage, the user presses a button on the transmitter and a radio signal is sent to the receiver inside the garage. The receiver then verifies the signal and opens the garage door. Multiple persons can make use of this system by configuring multiple radio transmitters. The use of such a system poses a security issue, which evolves from many possible situations that finally lead to unauthorized access. For example, the radio transmitter can be stolen or lost, the radio code can be captured and reproduced with a specialized receiver, or codes can be tested within a certain neighborhood to find matching locations.

Christos Nikolaos E. Anagnostopoulos [2] have proposed, a new algorithm for vehicle license plate identification is proposed, on the basis of a novel adaptive image segmentation technique (sliding concentric windows) and connected component analysis in conjunction with a character
recognition neural network.

The algorithm was tested with 1334 natural-scene gray-level vehicle images of different backgrounds and ambient illumination. The camera focused in the plate, while the angle of view and the distance from the vehicle varied according to the experimental setup.

S. Chang, L. Chen, Y. Chung and S. Chen [3] have proposed the Automatic license plate recognition (LPR) plays an important role in numerous applications and a number of Techniques have been proposed. However, most of them worked under restricted conditions, such as fixed illumination, limited vehicle speed, designated routes, and stationary backgrounds. In this study, as few constraints as possible on the working environment are considered. The proposed LPR technique consists of two main modules: a license plate locating module and a license number identification module. Christos-Nikolaos E. Anagnostopoulos [4] have proposed the License plate recognition (LPR) algorithms in images or videos are

generally composed of the following three processing steps: 1) extraction of a license plate region; 2) segmentation of the plate characters; and 3) recognition of each character. This task is quite challenging due to the diversity of plate formats and the non uniform outdoor illumination conditions during image acquisition.

Section I of this paper is a background introduction. Section II discusses a brief literature review of License plate recognition. Section III describes the complete system in the form of a block diagram. Section IV describes the experimental results. Concluding remarks and a scope for further research are given in Section VII.

III. PROPOSED SYSTEM

This system consists of edge detection algorithm which is used to find the longer edges in license plate. Fig.1 represents the functional architecture of the proposed system.

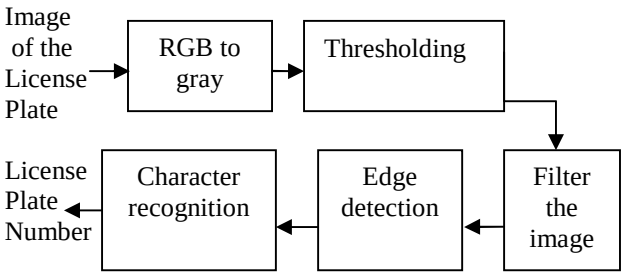

Fig. 1 Functional architecture

First, the image of the license plate is given to the RGB block it convert the RGB image in to gray scale image. Second, the output from the RGB block of gray scale image is given to the median filter block which is used to remove the noise of an image. Third, the filtered image is given to the edge detection block. Finally, recognition of license plate number using templates matching.

A. RGB to gray scale conversion

I = rgb2gray(RGB) converts the true colour image RGB to the gray scale intensity image I. rgb2gray converts RGB images to gray scale by eliminating the hue and saturation information while retaining the luminance.newmap = rgb2gray(map) returns a gray scale colour map equivalent to map.

The input is an RGB image, it can be of class uint8, uint16, single, or double. The output image I is of the same class as the input image. If the input is a colour map, the input and output colour maps are both of class double.

B. Thresholding the image

Level = gray thresh (I) computes a global threshold (level) that can be used to convert an intensity image to a binary image with im2bw. Level is a normalized intensity value that lies in the range [0, 1].The gray thresh function uses Otsu's method, which chooses the threshold to minimize the intra class variance of the black and white pixels. Multidimensional arrays are converted automatically to 2-D arrays using reshape. The gray thresh function ignores any nonzero imaginary part of I. Level EM] = gray thresh (I) returns the effectiveness metric, EM, as the second output argument. The effectiveness metric is a value in the range [0 1] that indicates the effectiveness of the thresholding of the input image. The lower bound is attainable only by images having a single gray level, and the upper bound is attainable only by two-valued images.

C. Filtering the image

Median filtering is a nonlinear operation often used in image processing to reduce "salt and pepper" noise. A median filter is more effective than convolution when the goal is to simultaneously reduce noise and preserve edges. B=medfilt2(A, [m n]) performs median filtering of the matrix A in two dimensions. Each output pixel contains the median value in the m-by-n neighborhood around the corresponding pixel in the input image. medfilt2 pads the image with 0's on the edges, so the median values for the points within [m n]/2 of the edges might appear distorted. B = medfilt2(A) performs median filtering of the matrix A using the default 3-by-3 neighborhood. B = medfilt2(A, 'indexed',...) processes A as an indexed image, padding with 0's if the class of A is uint8, or 1's if the class of A is double.

D. Sobel edge detection

There are several conventional edge detection methods in image processing. They are Prewitt edge detection, Roberts edge detection, Sobel edge detection, Canny edge detection. The Sobel operator performs a 2-D spatial gradient measurement on an image and so emphasizes regions of high spatial frequency that correspond to edges. Typically it is used to find the approximate absolute gradient magnitude at each point in an input grayscale image.
The Sobel operator is slower but its larger convolution kernel smooth's the input image to a greater extent and so makes the operator less sensitive to noise. The operator also generally produces considerably higher output values for similar edges, compared with the Roberts Cross.

E. Character recognition

The vehicle can be classified based on the number plate color. If it is yellow background the number plate can be classified as a commercial vehicle. If it is white background the number plate can be classified as a private vehicle. Fig 2and 3 shows the templates of both number and alpha characters

Fig. 2 Templates for the number character recognition.

Fig. 3 Templates for the alpha numeric character recognition.

F. Stochastic gradient descent (SGD)

In addition to performing linear classification, SVMs can efficiently perform non-linear classification using what is called the kernel trick, implicitly mapping their inputs into high-dimensional feature spaces. Most of these algorithms use either Variants of primal stochastic gradient descent (SGD), Quadratic programming in the dual. In gradient descent, we compute the gradient using the entire training set. A superficially simple alteration of this is to find the gradient with respect to a single randomly chosen example. This technique is called stochastic gradient descent (SGD). By using only a single example we are only getting an approximation to the true gradient; therefore, we are no longer guaranteed to move in the direction of greatest descent. Nonetheless, there are at least two important reasons why stochastic gradient descent is useful for learning problems: It is significantly quicker than gradient descent when n is large, and It can be shown that stochastic gradient descent minimizes the generalization error quicker than gradient descent.

IV. EXPERIMENTS AND RESULTS

In this section experimental results are made to identify the license plate number. The result analysis for different types of Indian license plate are shown in Fig. 4.

(a) Black on yellow

(b) black on white

(c) Extracted number

Fig. 4 Indian license plates.

V. CONCLUSION AND FUTURE WORK

In this paper, we proposed a RUCV system it is used to detect the Indian license plate number. The advantage of this method is to correctly recognize the authorized and unauthorized vehicle license plate number. In licese plate recognition the time consumption is less.

The future work of this paper we use a Wireless communication module which has a code word Embedded on it the code word is not changeable when the user enters the premises he just presses the button on which the Code word is sent to the Recognizer Module. The module then recognizes the number plate from the code word and checks the integrity of the number plate with that of the car and allows access to the car. For additional security, an alarm may be generated as soon as someone with a non-authorized car, but with the same plates appears.

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