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Automatic Number Plate Recognition

Gaurav Srivastava[1], Aashish Sharma[2], Abhishek Mittal[3], Abhinav Shishodia[4], Anubhav Gaur[5]
[1, 2, 3, 4, 5]*Inderprastha Engineering College, Ghaziabad (U.P.), India*

Abstract: ***Segmentation and recognition plays a key role in the Number Plate Recognition (NPR) structure. It is a picture dispensation knowledge which uses number plates to recognize the object. Substantial literature exists and extensive research has been done till now regarding number plate recognition systems to resolve recognition problems and how it can be used in real time. The objective is to develop an efficient system using number plates. The proposed system first detects a vehicle and then captures its image which is followed by extraction of number plate location followed by recognition. The output plate number obtained is then matched with the data records saved in the database to acquire information of driver's name, vehicle registration place. The system is implemented and simulated in MATLAB as huge codes can be directly replaced by single preloaded methods. Paper also discusses certain areas and the future research which can be done in the field of NPR for efficient application of the technique in the real world.***

I. INTRODUCTION

With the increase in today's population, vehicles on the road are also rapidly increasing therefore authenticity of driver and vehicle is a major concern nowadays. It will take a lot of manpower and an enormous amount of time for manual entries of each vehicle and also after that,100 percent accuracy is not guaranteed. To resolve this issue, we develop a software system aka Automatic Number plate Recognition (ANPR) which Automatically recognizes the number plate and stores it in the database. This system helps in controlling the traffic and its major application is security. It helps in access control of unwanted vehicles in restricted areas and zones and for monitoring vehicles on the road.

Identification of Number plate is not an easy task due to the nature of light. This system investigates an input image area which contains licence plate. An input image can contain plate number anywhere so it is difficult to check every region of the input image. In ANPR system uses technique called spectral analysis which is used to acquire the image, extract the number plate region from the input image followed by character segmentation for matching each extracted letter with the letters stored in the system database.

The main advantage of this technique is that it can catch the image of moving vehicle and then send it for segmentation and recognition[1]. Now if the output number plate matches with the registered number plate in the database then it is allowed to go forward otherwise it is restricted. This system can be implemented in parking slots, societies, colleges, toll etc.

The task to detect Number plate from input images of the car in an open environment is not easy because of the colour of number plate characters and the background of the same. Gradients from actual images are first adopted to determine candidate number plate regions[2]. At present, we have algorithms that are dependent on Canny edge detector, morphological operation, and segmentation.

The algorithm for license plate location comprises of several stages such as Edge Detection, Morphological operation similar to dilation and erosion. Smoothing, character segmentation and plate characters recognition are discussed in [3][4][5][6].

II. GENERAL NPR SYSTEM

Block diagram of general ANPR system is discussed in fig.1.

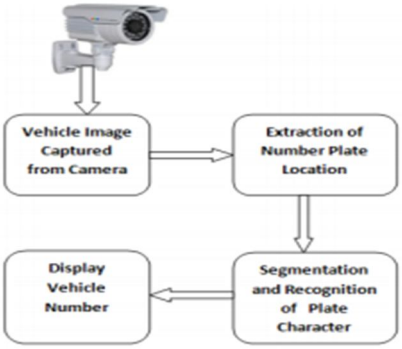


Fig.1. System Block Diagram

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A. Vehicle Image Browse/Captured by Camera

The image of the vehicle whose number plate is to be identified is apprehend using digital camera of 3.2 MP.



Fig.2. Captured Image

B. Extraction of Number Plate Location

In this pace the number plate is extracted by initially converting RGB Image i.e., the apprehend picture to Gray Scale picture. Here numerical morphology is used to sense the region and Sobel operative is used to job of the threshold worth. After this we get a dilate image. Then infill purpose is used to pack the holes so that we get a apparent binary image.

C. Segmentation and Recognition of Plate Character

Now bound box exercise is used for segmentation. The bounding box is used to compute the inherits of this exacting image area. This critical step in recognition of vehicle number plate is to notice the part of plate. Now this improved image is crossed with Gray scale so that we could obtain apprehend cover.

C. Display Vehicle Number

After following the above steps, the corresponding number plate is obtained in MATLAB.

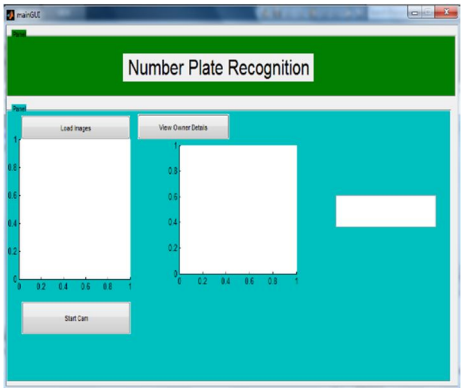


Fig.3. User Interface

III. NPR IMPLEMENTATION USING MATLAB

The complete procedure of NPR functioning using MATLAB is stated below:

A. Input Image

This is the primary stage deals with acquire an image. In this projected system, digital camera of exact 3.2 megapixels used. Input image is 120 x 160, 1200 x 1600.



Fig.4. Input Image

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B. Extraction of Number Plate Location

The inserts to the system are the imagery of vehicles captured by camcorder. RGB to Gray-scale transformation is adopted, in process to assist the character extraction, and boost the dispensation haste. Highlighted image (RGB) acquired by a digital camcorder is renewed in a Gray-scale image: -

Gray=0.114*R+0.587*G+0.299*B……(1)



Fig.5.1. Extraction of Number Plate Location (I)

The essential move in acknowledgment of vehicle number plate is to notice the plate size. In common, number plates are in rectangular shape, thus it is essential to notice the limits of the rectangular plate. Mathematical morphology is used to notice the region of attention and Sobel operator are used to calculate the threshold value, that detect high light regions with high edge magnitude and high edge variance.

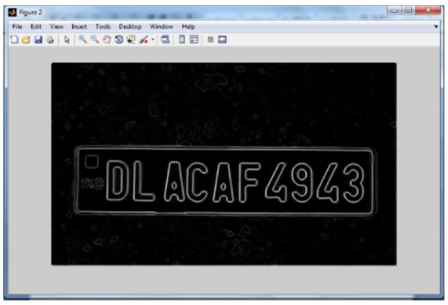


Fig.5.2. Extraction of Number Plate Location (II)

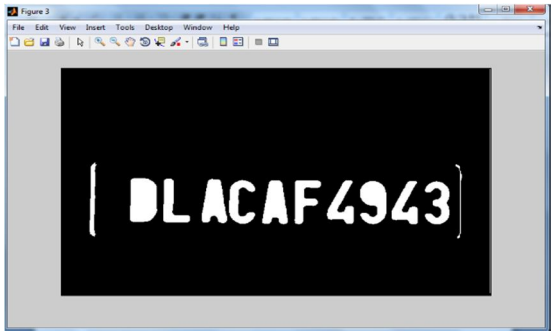


Fig.5.3. Extraction of Number Plate Location (III)

Now, we get the lines of the elevated contrasted images through a binary gradient mask. But we don't get quite a precise outline of the purpose of interest. Compared to the unique section, difference in joining lines can be viewed that environs the item in the gradient mask. But if we expand the Sobel image using linear structuring elements then linear gaps can get vanish. We symbolize the Structuring element as matrices, which are a characteristic of a sure structure and helps to measure the figure of an image which is used to bear other picture dispensation operations. Via the upright structuring constituent followed by the straight structuring constituent we extend the binary gradient mask.

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In MATLAB there is a function imfill (BW, "holes") that support to fills holes in the binarized image. The dilated gradient mask shows the sketch of the cell quite correctly, but we can still see some holes in the inside of the cell. Outlet is recognized as the place of setting pixels that have not separated by fulfilling the backdrop from the limits of the figure. In Figure 5.2 we can see what it will occur after removing fewer than 100 associated pixels. So, to fill these holes imfill function in MATLAB is used.

C. Remove Connected Objects on Border

The section of interest has now effectively segmented, but it is not the simply object that has been establish. Any objects that are associated to the edge can get eliminate using the unclear edge function in MATLAB. The connectivity of this function has been set to 4 or 8 to eliminate diagonal connections and to fill the hole to set the plate section. After omitting the machinery of the minor pixel authentic plate sector is detected.

D. Character Segmentation

Character segmentation in number region detection is the most imperative module, because it is the core for all auxiliary steps that are rely on it. If there is a collapse in segmentation, a character could get indecently divided into half pieces, or two characters. So to decide this trouble there comes a practice called boundary box technique. The bounding box procedure is used to determine properties of the image section. Once a bounding box formed for every character and for each number accessible on number plate, each character & number is separate out for recognition of number plate. The result of operation is shown.

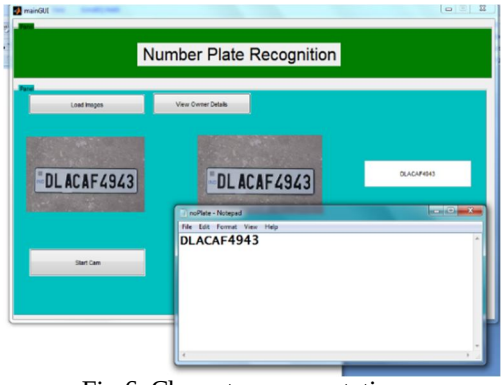


Fig.6. Character segmentation

IV. CONCLUSION

In this scheme, application software is designed to find the facts of the owner or car by detecting vehicles number plate. First, we remove the position of a plate using morphological process then we divide the plate characters separately by segmentation. Finally, we contest template with the use of correlation for gratitude of plate characters. Some promising difficulties are: 1. Broken number plate. 2. Blurry image. 3. Observed region not within the perfect requirement. 4. Less clarity of the visuals. 5. Deprived preservation of the vehicle section. comparison amongst same symbols, like, O and D; 5 and S; 8 and B, E; O and 0, etc.

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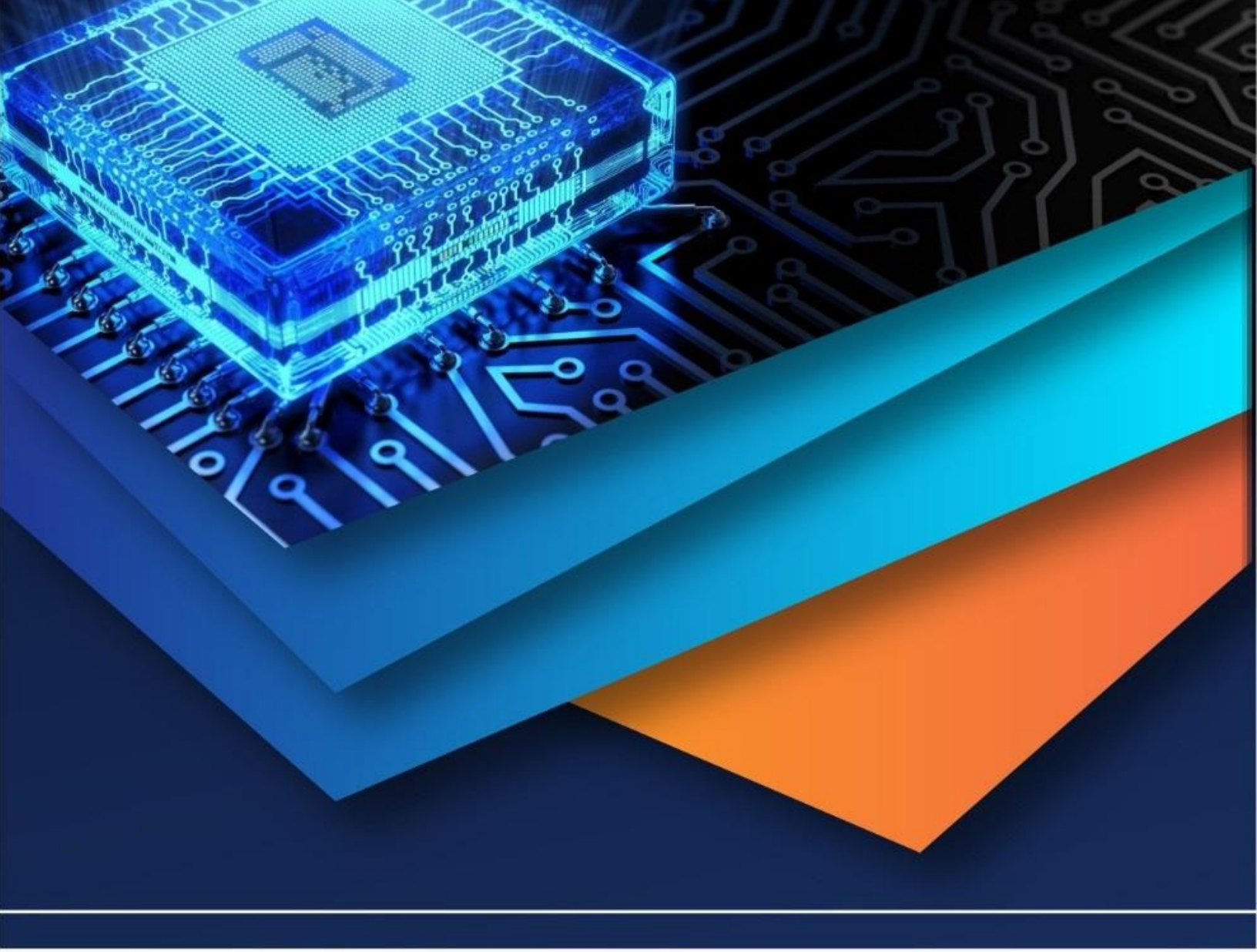
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