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Automatic License Plate Recognition Using Image Processing

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Abstract

In recent times, the quantity of vehicles on road has exponentially up because of that hold up and violations square measure a menace on roads. Automatic registration number plate Recognition system may be accustomed change the method of traffic management thereby easing out the flow of traffic and strengthening the access management systems. This automatic range plate recognition system uses image process technology for identification of the vehicles. this method may be employed in extremely inhabited areas and extremely restricted areas to simply establish traffic rule profaned vehicles and owner's name, address and alternative data may be retrieved victimization this method. this method may be machine controlled and it's accustomed acknowledge vehicles while not authorization, vehicles that profaned rules at inhabited areas like malls, universities, hospitals and alternative automotive parking heaps. this may even be employed in the case of automotive usage in terrorist activities, smuggling, invalid range plates, purloined cars and alternative outlawed activities. It can even be employed in main road electronic toll assortment. Image of the automotive range plate is captured and detection is completed by image process, character segmentation that find the alpha numeric characters on variety plate. we tend to meant to develop a system in MATLAB which may perform detection still as recognition of a automotive range plate.

Keywords: Automatic registration number plate Recognition, Optical Character Recognition, Artificial Neural Network, Image process

1. Introduction

Number plates square measure utilized as distinctive proof of vehicles all over throughout the countries. {the range, the amount, the quantity} plate recognition system uses an image handling technique for perceiving cars by their number plates. range plate recognition systems square measure utilized with the purpose of viable movement management and security applications like access management to restricted regions and pursue wished vehicles. With the rise in range of accidents and traffic-rule violation, identification of vehicles has become a task of prime importance. This task becomes a lot of sophisticated since the captured range plate may be from totally

different environmental background having different fonts, angles, sizes etc.

The {license plate car place registration range plate vehicle plate registration code} Recognition (NPR) system for Indian range plate is troublesomely contrasted with the foreign number plate as there isn't any customary took when for the proportion or quantitative relation of the quantity plate size. the popularity task is troublesome attributable to the character of the sunshine, that causes the image acquisition troublesome. In NPR system photo-detection approach is employed that features effort a photograph of the vehicle, extracting the region of interest, and character segmentation and extraction.

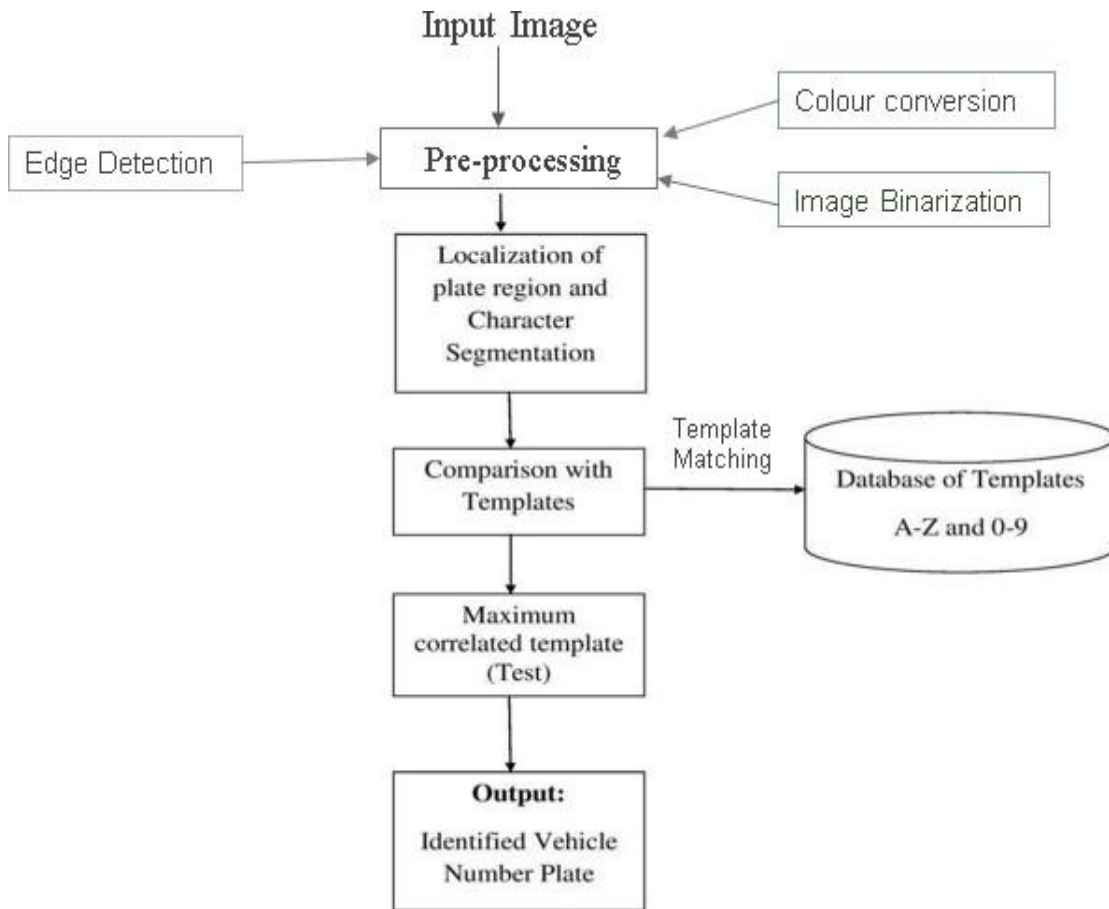


Figure 1: Block Diagram of Proposed Methodology

2. Methodology

The procedures to develop the image process and registration number plate recognition steps for the projected system area unit illustrated below:

a. Data Acquisition

The data acquisition procedure is completed by exploit pictures of vehicles from numerous sources. Knowledge acquisition is a vital and significant procedure for this project. The key reason is that the image quality actually defines the result of the popularity result. the information acquisition procedure is completed by exploit pictures of vehicles and conjointly the template for all the alphanumeric characters is additionally non inheritable.

b. Colour Conversion Techniques:

The captured pictures are either RGB pictures or Grayscale. The quality of the code and problem in visual image is that the main reason for

RGB to grayscale conversion of the image. additionally, the RGB image is additionally troublesome to be metameric. Thus, the captured pictures area unit regenerate from RGB image to grayscale image to provide a necessary image for segmentation procedure. This conversion is needed to scale back the quality of a picture.

c. Image Segmentation

The next step could be a crucial step in image process technique. Image segmentation is applied to implicate the image into a a lot of specific distribution of picture element. Thus,the regenerate grayscale images are processed.

The image created once Image segmentation would be easier to method so as to provide a metameric registration number plate image.

d. Noise Removal and Image subtraction

The next step is that the noise removal and image subtraction. This step is vital so as to get rid of the tiny spots and unwanted objects within the image so as to extend the accuracy of recognition method. There are several filters to get rid of these noises.

e. Image Crapping for the Segmented License Plate

The next step is that the image cropping. This method is performed so as to crop the metameric registration number plate by mistreatment the standardize values. The image cropping is completed consistent with the required angle and distance between the registration number plate and camera of the input image. This step is vital to extend the accuracy of the popularity method.

f. Optical Character Recognition based on Template Matching Method

Optical Character Recognition could be a method to spot the information from the metameric registration number plate. This method does not acknowledge written info on a picture to provide AN output knowledge consisting of characters. the method is completed by analyzing the bounding box on the photographs and make formula to match the similarity of the obtained character with the coaching knowledge. This formula is additionally referred to as template matching.

3. Design and Implementation

The main purpose of this paper is to discover characters from car place Image

provided by a camera. associate degree economical rule is developed to discover a car place in numerous physical property conditions. This rule extracts the car place knowledge from a picture associate degree provides it as an input to the stage of automobile car place Recognition. The image of a vehicle is given as associate degree input. Implementation of car place Detection rule victimization MATLAB.

3.1 Specific Requirements:

Non-Functional Requirements:

a. Usability: The user will provides a traditional clarity image as input and may interpret output with minimum data of basics.

b. Performance:

The projected system once giving the desired input takes less time to method and produces output accurately.

c. Support ability: The system may be enlarged additional to feature new factors which will have an effect on. The projected system will work below any s urroundings with none issues.

Software Requirements:

Operating System- Windows 10

Tools used- MATLAB

Language- MATLAB

3.2 Implementation

3.2.1 Data Acquisition

The first stage of any vision system is that the image acquisition stage. The key reason is that the image quality definitely defines the result of the popularity result. The info acquisition procedure is completed by feat pictures of vehicles. Once the image has obtained, numerous ways of process may be applied to the image to perform the various totally different vision tasks needed nowadays. Fig.2

shows many pictures of cars. supported these pictures, the photographs vary in step with the space and angle. the photographs are captured within the morning, evening and night. additionally, to that, vehicles with numerous colors are chosen for this analysis. The templates for all the alphameric characters are noninheritable.

3.2.2 License Plate Extraction

Localization of potential car place regions from vehicle pictures could be a difficult task because of Brobdingnagian variations in size, shape, color, texture and spatial orientations of car place regions in such pictures. In general, objective of any Automatic car place Recognition (ALPR) system is to localize potential car place region(s) from the vehicle pictures captured through a road-side camera and interpret them victimization example matching technique to induce the identification number of the vehicle.



Figure 2: The sample Images of the Captured Vehicle

3.2.3 Preprocessing techniques

a. RGB to Grayscale Conversion:

The captured pictures area unit the RGB image. drawback arises whereas process image that's the color will seem otherwise in numerous lightning conditions and additionally the complexness of the code and issue in visual image is that the main reason Color Conversion and to beat this, we have a tendency to scale back the quantity of colors and also the captured pictures area unit born-again from RGB image to grayscale image to provide a necessary image for segmentation procedure.

b. Image Binarization

Document Image Binarization is that the pre-processing step for document image analysis and process. It enhances the performance of document process techniques like OCR and layout analysis. Image Binarization is that the conversion of document image into bi-level document image. the only approach to binarization is thresholding. In thresholding associate degree optimum threshold price is chosen and also the pixels area unit classified as foreground or background by comparison with this threshold price.

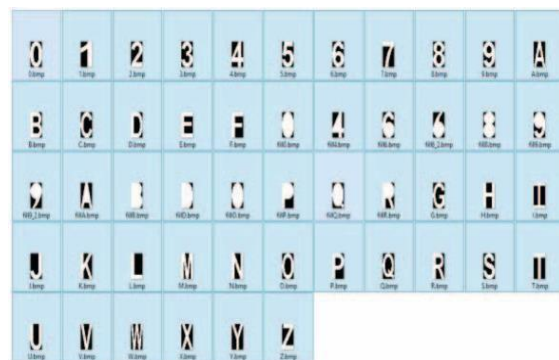


Figure 3: OCR Template Matching Test Data

3.2.4 Image Segmentation

Edge Detection

Edge detection could be a form of image segmentation techniques that determines the presence of a foothold or line in a picture and

descriptions them in associate degree applicable means. the most purpose of edge detection is to modify the image knowledge so as to reduce the number of knowledges to be processed. Generally, a foothold is outlined because the boundary pixels that connect 2 separate regions with dynamical image amplitude attributes like totally different constant physical property and tristimulus values in a picture.

3.2.5 Character segmentation

In this step get the o/p of extracted range plate victimization labeling elements, then separate every character and split the every and each character within the range plate image by victimization split and additionally notice the length of the quantity plate, then notice the correlation and information if each the worth is same suggesting that it'll generate the worth 0-9 and A - Z, and at last convert the worth to string is keep as character in some document during this code. Following figure shows the segmental characters.

3.2.6 Optical Character Recognition based on Template Matching Method

Optical Character Recognition by victimization example Matching could be a system epitome that helpful to acknowledge the character or alphabet by examination 2 pictures of the alphabet. The objectives of this method epitome area unit to develop a epitome for the Optical Character Recognition (OCR) system and to implement the example Matching rule in developing the system epitome.

Optical Character Recognition is that the method whereby typewritten or written pages may be scanned into laptop systems, and their contents recognized and born-again into machine-readable code. example matching is one in all the Optical Character Recognition techniques.

3.2.6 Template Matching Steps for Recognition

- i) The character image from the detected string is chosen.
- ii) The image to the scale of the primary example is rescaled.
- iii) The image to the scale of the primary example (original) image, the matching metric is computed.
- iv) The very best match found is keep. If the image isn't match repeat once more the third step.
- v) The index of the simplest match is kept because the recognized character.

4. Results and Discussion

1) Data acquisition is done by taking the image below as an input image. This input image isan RGB image.

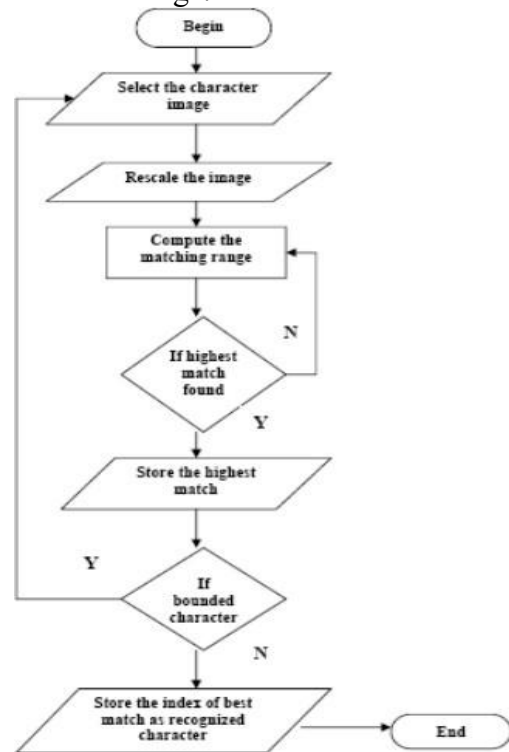


Figure 4: Workflow of the Template Matching Algorithm

2) The RGB input image is converted into grayscale image using the MATLAB function `rgb2gray()`



Figure 5: Input Image



Figure 6: Grayscale Image

3) In the grayscale image, we identify the license plate region and image segmentation is performed. Here we use image binarization technique.



Figure 7: Binarized Image

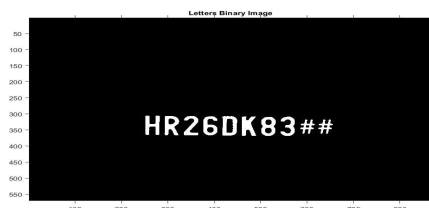


Figure 8: Binarized Image (Letters only)

4) . The boundaries of the objects within the image are found using the Prewitt's edge detection.



Figure 9: Edge Detected Image

5) Each character is detected from the extracted plate region. We split all the characters and crop it using image cropping or character segmentation.



Figure 10: Cropped Image

6). Then each character is bounded by a rectangular box using bounding box technique.

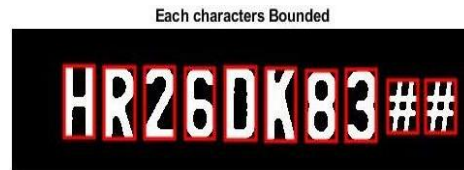


Figure 11: Bounded Characters

7). Every character is segmented and displayed.

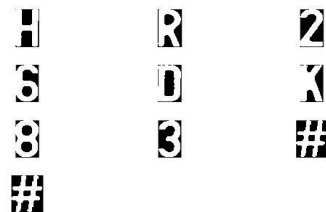


Figure 12: Extracted Characters

8) Template matching is performed and individual cropped image is compared with the database of each character and the maximum correlated character is displayed

in the outputscreen as shown in the figure 13.

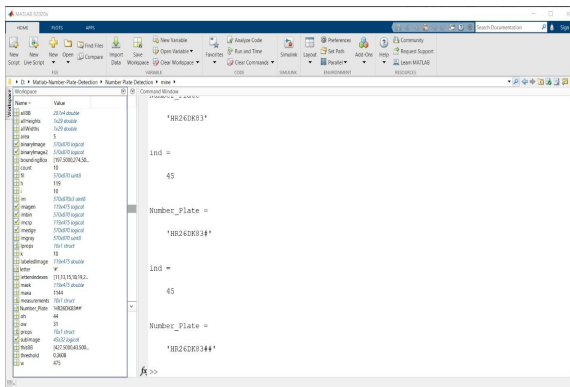


Figure 13: License Plate Number obtained as Output

5. Conclusion and Future Scope

The paper is designed so that we can understand the technology used in now-a-days, automatic license plate systems and OCR systems used in most of the developed countries like Germany, France, Singapore, Japan, etc.

We have successfully completed our major aim that is to build an automatic license plate recognizer using image processing and template matching techniques. The longer term work can involve in recognizing the individual characters from the plate with different color backgrounds with the quality templates issued by the govt. Also, a detector is often designed to permit the camera to capture the image only needed to save power.

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