

Vehicle Number Segmentation and Recognition by Using Region Properties and Thresholding

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Abstract: *Vehicle registration number plate recognition (VLPR) has been intensively studied in several countries. Thanks to the various styles of variety plates getting used, the wants of Associate in nursing automatic variety plate recognition system are totally different for every country. During this paper, variety plate segmentation, localization and recognition system for vehicles in Tamilnadu (India) is planned. This technique is developed supported digital pictures and might be simply applied to industrial lot systems for the utilization of documenting access of parking services, secure usage of parking homes and additionally to forestall automotive thieving problems. Segmentation of the plate characters was achieved by thresholding, labeling and filling up the holes approach was planned during this paper. Median filter was additionally applied to get rid of the unwanted noise that is suffering from the scanning device. By exploitation model matching formula we are able to acknowledge the characters of the amount plates. Recognition rate of concerning ninety seven this means that the formula is kind of effective.*

Key words: Vehicle license plate recognition, segmentation, template matching.

1. Introduction

License Plate Recognition: variety plate vehicle plate registration code Recognition (LPR) is a picture process technology won't to establish vehicles by their number plates. In sight of its potential application in traffic watching systems and main road toll assortment, LPR systems have recently attracted wide interest as a part of associate degree Intelligent Transport System. The primary invention of the automated range Plate Recognition (ANPR) was in 1976 at the Police Scientific Development Branch within the kingdom. Image systems were operating by 1979 and contracts were let to provide industrial systems. There are various applications of vehicle plate recognition systems for any given country. They embrace main road electronic toll assortment, automatic parking attendant e.g. in banks, hotels, airports and fleet vehicle compounds, client identification sanctioning personalized services e.g. in golf clubs, leisure centers, filling station police investigation, regulation social control and security among others.

Massive integration info of data knowledge technologies into all aspects of recent life caused demand for process vehicles as abstract resources in information systems. As a result of a standalone system with none information has no sense; there was conjointly a requirement to remodel info regarding vehicles between the fact and knowledge systems. This could be achieved by a personality's agent, or by special intelligent instrumentality that is to be able to acknowledge vehicles by their variety plates in very real surroundings and replicate it into abstract resources. Due to this, varied recognition techniques are developed and variety plate recognition systems or nowadays employed in varied traffic and security applications, like parking, access and border management, or chase of taken cars. In parking, variety plates are accustomed calculate length of the parking. Once a vehicle enters associate input gate, variety plate is mechanically recognized and keep in information. Once a vehicle later exits the park through associate output gate, variety plate is recognized once more and paired with

the first-one keep within the information. The distinction in time is employed to calculate the parking fee. Automatic variety plate recognition systems are often employed in access management. For instance, this technology is employed in several firms to grant access solely to vehicles of approved personnel. The process contains five steps: First is data base creation, Second is selecting an image nothing but image acquisition, third is preprocessing i.e. normalization, adjusting the brightness, skewness and contrast of the image, fourth is segmentation, fifth is recognizing the characters by template matching.

2. Image Acquisition

Image acquisition is that the 1st innovate registration number plate recognition method. Image will be no inheritable employing an analog camera with a scanner or victimization a photographic camera. Image acquisition through analog camera is impractical. The reliable and sensible approach is feat pictures through photographic camera.

3. Filtering

In fact, filtering is utilized to wipe out objects that don't suit some specific options. Within the projected approach, the route of filtering begins by initial distinguishing each region. A collection of white pixels is termed a part if they're eight connected pixels. Once each constituent of a part is noticed, the region is tested for its size and form. The intention behind filtering operation is to pick the regions that may provide out as attainable registration number plate boundaries and eliminate the others by filling black colors in their place. For this purpose we've used median filter, it removed the unwanted noise and it'll improve the standard of the amount plate. Median filtering is then enforced for the effective removal of speckle noise, salt and pepper noise (impulsive noise).

4. Segmentation

After image acquisition and pre-processing it will given to the segmentation part. First the image was converted into gray scale after that thresholding algorithm is applied on this gray scale image to represent it as a black and white image (binary image). Then black & white fill is applied to the binary image. BWFILL differs from many other binary image operations in that it operates on background pixels, rather than foreground pixels. If the foreground is 8-connected, the background is 4-connected, and vice versa, this is called as segmented image. Now we have to find out the area of the particular plate. For this region properties have to be verified. These will Measures the properties of image regions. The region consists of too many properties, in that 'area, orientation and the bounding box' are some important properties.

REGIONPROPS does not accept a binary image as its first input. There are two common ways to convert a binary image to a label matrix:

1. $L = \text{bwlabel}(BW);$
2. $L = \text{double}(BW);$

The first method of forming a label matrix, $L = \text{bwlabel}(BW)$, results in a label matrix containing two contiguous regions labeled by the integer values 1 and 2. The second method of forming a label matrix,

$L = \text{double}(BW)$, results in a label matrix containing one discontinuous region labeled by the integer value 1. Since each result is legitimately desirable in certain situations, REGIONPROPS does not accept binary images and convert them using either method. You should convert a binary image to a label matrix using one of these methods (or another method if appropriate) before calling REGIONPROPS. We can remove the unwanted regions by calculating the one of the region property i.e., area. After finding the three properties the segmented image (only the number plate) was obtained with its features.

5. Character Segmentation

Character segmentation is that the procedure of extracting the characters and numbers from the registration code image. Various aspects create the character segmentation task difficult, like image noise, plate frame, space mark, plate's rotation and light-weight variance. Variety of procedures is projected for character segmentation to beat these aspects. Proposes the vertical and horizontal scanning for character segmentation.

5.1 Vertical Scanning

Vertical scanning technique is utilized to dig out every character from the image found on 1st and last column element. It's into the image by element vertically from $[0, 0]$ till $[\text{width}, \text{height}]$ that is dead in column by column scanning. Because the input image could be a binary image that consists of one and zero values, vertical scanning theme is straightforward to be dead. The dimensions between every 1st and last column are going to be computed. At last, each character or varieties are going to be slice to separate it from

the plate background. Every component is going to be kept in array individually for next horizontal scanning method.

5.2 Horizontal Scanning

Once each component is saved individually in preceding step, horizontal scanning can determine the primary and last rows of the image. The intention is to eradicate further higher and lower region from the image. To conclude, the end result of this method are going to be a picture with packed with character or range parts with none spare areas. The segmented characters are shown in Figure 5.

6. Recognition

Here the comparison between input image and the data base images was to be done by using correlation coefficients and template matching.

6.1 Character Recognition

After the segmentation of elements (characters and numbers), the final step in the recognition process is character recognition. In the last step, character recognition is done by utilizing template matching technique.

6.2 Template Matching

In the final step, every character from the previous module is going to be matched with the keep templates of the character. These keep templates include pixels. These pixels are termed as check purpose. There are 2 forms of check purpose. One check purpose is termed white check purpose and therefore the alternative is termed as black check purpose. The white space of the character image from segmentation stage is checked by the white test purpose. Black check purpose is employed to check the black space of the character image. All the number from 0 to 9 and all the alphabets from A to Z of the input number plate are compared with the data base images. If the input number plate was match with the data base images then or shows the result as authenticate otherwise it shows the unauthenticated.

7. Experimental Setup and Results



Figure 1: Input Image



Figure 2: Gray Scale Image



Figure 3: Number Plate Area and Binary Image of the Plate

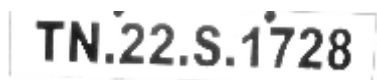


Figure 4: Extracted Number Plate from the Binary Image without Noise

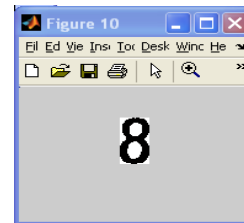
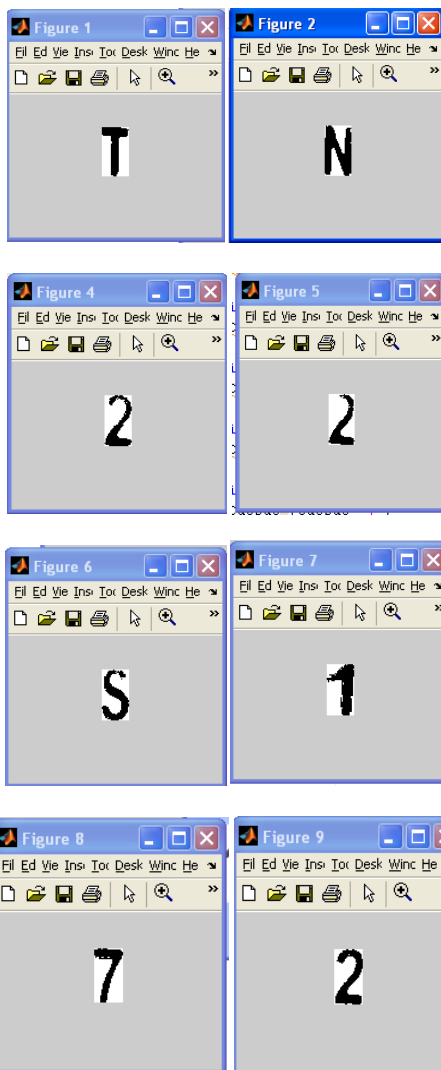


Figure 5: Segmented Horizontal and Vertical Scanned Images

8. Conclusion

The system works satisfactorily for wide variations in illumination conditions and differing types of range plates normally found in Asian nation. It's undoubtedly a far better various to the present manual systems in Asian nation. presently there square measure sure restrictions on parameters like speed of the vehicle, script on the amount plate, cleanliness of range plate, quality of captured image, skew within the image which might be competently removed by enhancing the algorithms any.

9. Future Scope

We have used neural-network and fuzzy logic in MATLAB to obtain the desired results. It can give us a relative advantage of data acquisition and online warning in case of stolen vehicles which is not possible by traditional man handled check posts. While thousands of vehicles pass in a day. Though we have achieved an accuracy of 98% by optimizing various parameters, it is required that for the task as sensitive as tracking stolen vehicles and monitoring vehicles for homeland security an accuracy of 100% cannot be compromised with. Therefore to achieve this, further optimization is required. Also, the issues like stains, blurred regions & different font style and sizes are needed to be taken care of.

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