

RECORDED AWARENESS ABOUT VEHICLE PLATE THROUGH MATLAB

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ABSTRACT

The Vehicle Plate tool has earned great fame during the last decade and beside it the digital cameras and computational capacity also improved. Vehicle Plate system is introduced through MATLAB. For this very purpose, the techniques based on some images are displayed to find out the number. The recorded awareness system about Vehicle Plate capture some images, then for the brighter image, some active work is done then number plate is detected from the image through fractionalization. Numbers are extracted from the number plate characters in the number plate identified through the optical character recognition.

KEYWORDS: *Vehicle Plate, Optical Character Recognition, Fractionalization, Computational Capacity, Registration Plate Characters, MATLAB*

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INTRODUCTION

The advancement in the information technology has become the need of the time for the maintenance vehicle records. The humans, as well as the computers, perform this action, in this way the number plate of the vehicle is recognized.

For the recognition of vehicle, various techniques are introduced. Many areas are covered by License Plates. Human beings recognize the vehicle through number plate however, for machine [1] it is something troublesome on the grounds that machine just sees it as a segment of the picture with certain radiance and intensity. A unique system is needed to be built by using mathematics which can help recognize the number plate such system is RVPR.e(RECORDED VEHICLE PLATE RECOGNITION). The RVPR is an arising idea in both the computer vision and artificial intelligence (AI) as well. This system was liked and built both by Hardware and Software. Input, output and processing is possible because of hardware. Vehicle plate identifies the vehicle through its number plate and this number plate is also checked by human beings. Vehicle plate-system acts more rapidly in case super cameras are used to take an input image and the lightening situation is additionally very well [2]. Segmentation and recognition algorithm gets affected if the image quality or lightening condition is bad.

Moreover, high precision, efficient segmentation, deal with various characteristics of images, a diverse range of images are obtained by appending additional equipment the invisible device improves the framework to perceive the

registration plate(licensed plate). This licensed plate sector is located in the vehicle image. For further processing, the segmented image goes through some filter. Division of segmented image takes place and character images are formed.

For each character, the technique of optical character recognition is applied. The character of the number plate is recognized through OCR technique and separate file saves it. Some other programs also use this file. In order to recognize the character easily, the character image is compared with the template by using the OCR technique. In the world of reality the case is the reverse, because OCR faces the problem of bad quality image, a shadow on number plate and the problem of low-resolution image.

REVIEW OF LITERATURE

A very active algorithm was presented by Rathor and Saroj [2] that presented the positive forwarded favorable and successful outcome even on the abysmal image. The presented framework is valuable in directing traffic, in restoring looted autos furthermore includes the parking system can also be made more effective.

For the purpose of verification, an extracted image of the number plate is found in a text file. In the restoration of stolen autos, the number plate identification is useful, a vehicle can easily be identified in a great rush and furthermore car parking system can be made more smooth.

C.N. Anagnostopoulos et al. [3] organized algorithms were based on neural work showing better identification and segmentation methodologies. This particular algorithm was tested on the 1334 image with various lightening conditions, level of shadows differently made on the number plate and coming forth of different backgrounds and angles. Better results of the algorithm are found on 1287 image out of 1334 image.

Zheng, L et al. [4]in the multi-class SVM System presented by Kaur and Vijay [5]describe the actual time image structure segment and the optical representation recognize the concerned number. The camera itself captures the image and segmentation comes in the process. Such identical templates are used for the mindfulness of each segment located in the Database.

Prida Ami *et al* [6] these are the two algorithms used for segmentation and recognition. Segmentation causes sub-images. For recognition, template matching is specifically used.

METHODOLOGY

There are 3-categories of work division which are namely processing, identical division and extraction and other is number identification. Work distribution of this stages are as follows:

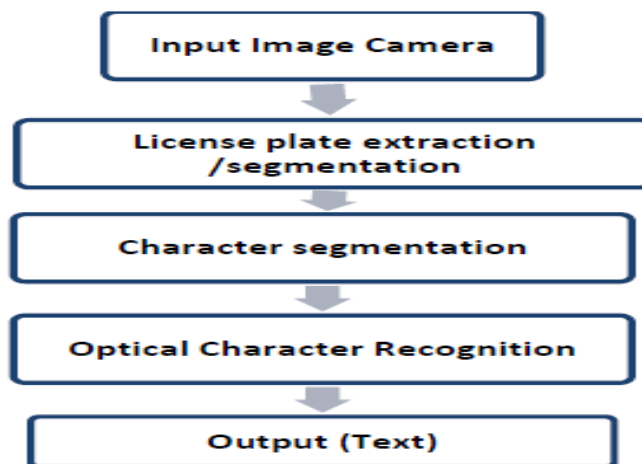


Figure 1

Preprocessing

This methodology is helpful in omitting noise it improves the quality and format of the image. The preprocessing applied to the color image is as follows:

- Image resizing
- Conversion of RGB color image into gray scale image

With the help of the MATLAB function *rgb2gray*, this conversion is performed.



Figure 2: Gray Image

Image Filtrations

The median filters are selected in order to omit the undesired noise from the image. It is a nonlinear digital in this way the choiced item is selected. This noise removing filter is useful enough and in this way, edge can be approachable.



Figure 3: After Applying Median Filter the Image of Car

Enhancement of Edge

The morphological gradient is used in this case. The morphological operator dilation and the erosion act like the local maximum operator and local minimum operator respectively.



Figure 4: Edge Enhancement Image

Brightening of Image

This terminology especially stands for brightening the edges in the images. Brightness helps a ton in distinguishing the edge, which is useful in perceiving the required digit from the registration plate. In this case the fixed/permanent program in MATLAB and we utilize *conv2*



Figure 5: Image with Lighted Edge

Intensity Scaling

Through this stage, there is a rise in the intensity of white pixels whereas, the intensity of black pixels goes rapidly down. For this sake, *imadjust*, the built-in function of MATLAB is utilized.



Figure 6: Contrast Enhanced Image

Horizontal Lines Elimination

This elimination is done by using the morphological gradient. These horizontal lines existing in the image create hindrance for the segmentation of character from the number plate. So, after the removal of the horizontal lines from the area of number plate, it gets easy to take the required number from the remaining part of the image. For this purpose, the Eroded image-original image, the morphological operation is utilized.

Filling of Image

This term stands for the filling of characters in the image but, in such a way that their shape doesn't change. In order to do this *imfill*, MATLAB built-in function is used. Through this function the background pixel of the image gets filled but, this condition is applied only if the beginning and terminating points are mentioned.

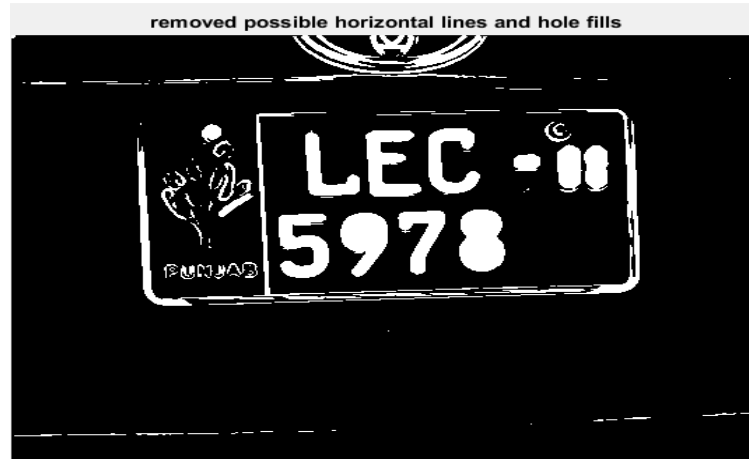


Figure 7: Whole Filling for Remove Lines

A p -by-1 vector for location shows that it comprises of the linear indices of the beginning locations. A p -by- n dims (BW) matrix for location reveals that each row carrying the array indices of one of the beginning locations.

Small Objects and Line Removal

The superfluous lines are omitted and chances are improved for the recognition of character.

It is done by *bwmorphand* then *imerode*, the built-in function of MATLAB. Similarly the removal of unwanted object is done by *bwarea open*, the MATLAB built-in function.

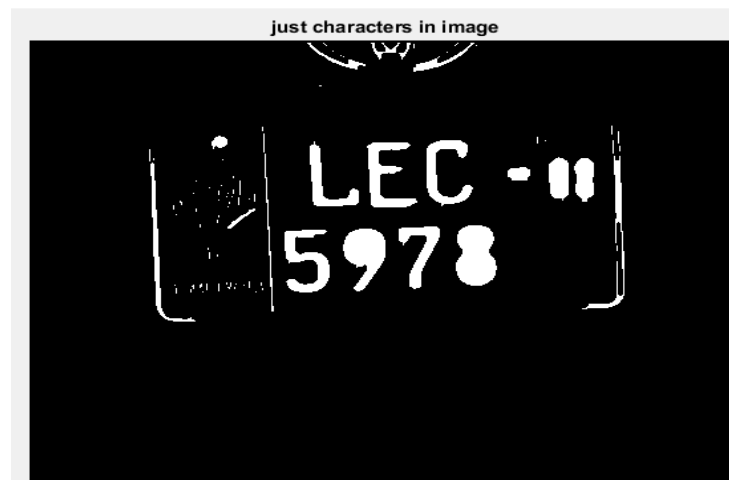


Figure 8: Clear Character on Image

Clearing of Border

MATLAB function is used for border clearing called in clear border. This is done by taking the input image and then clearing its encompassing border by omitting the superfluous lines on the image.

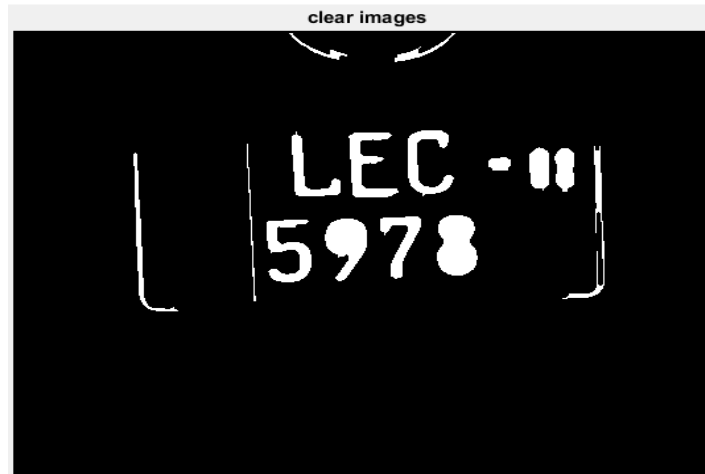


Figure 9: Clear Image

Segmentation of Character

It is actually a procedure which is used for the character segmentation from the image. If the segmentation of characters is not done in a befitting manner then the processing seems futile. In this way, the value of segmentation rises very high. It is something necessary to do the character segmentation very tactfully. Supposed the character segmentation is not handled very tactfully then might be one character isolates into two characters or two characters section as one. So, it becomes something arduous for the character acknowledgment code to perceive the character.

Bounding Box

The absolute solution for the mentioned above issue is bounding boxes strategy. This technique extracts the property of a particular image area. The specialty of one bounding box is that it contains each character. By using the technique of bounding box each character can easily and independently be perceived.

For this reason, *region props*, the MATLAB built-in function is used which comprised of the properties of “Bounding Box” and “image”.

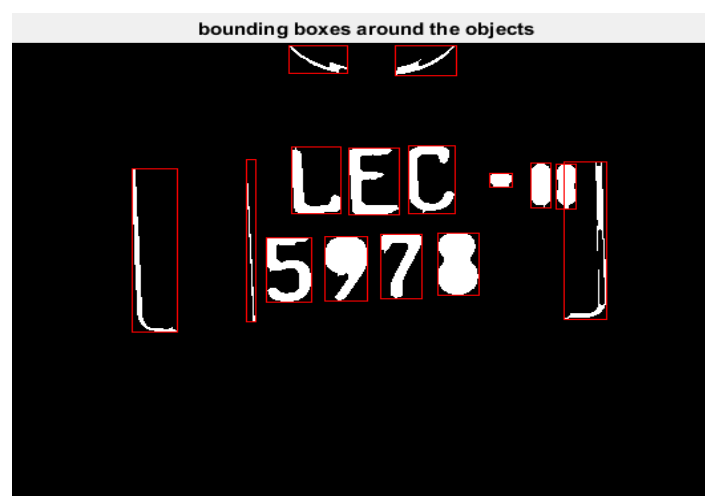


Figure 10: Bounding Boxes

Interested Bounding Boxes

In spite of the fact that all the object is now surrounded by the bounding boxes, the problem still exists, for example, picking or character segmentation. There ought to be an approach to simply pick or segment those bounding boxes which are around the character on the number plate. Moreover, it should overlook those bounding boxes which are around the objects other than the number plate characters.

Bounding Box Index Finding

The bounding boxes indices are found and then extracted these from the list. In this way, the interested bounding boxes are obtained which have Y-dimension width or likewise called Y-coordinate. Recorded number plate framework of vehicle is applied to utilize MATLAB.



Figure 11: Interested Bounding Boxes

Recognition of Character

In order to recognize the character from the number plate each character is selected as a binary image template then matching is utilized. It begins with the template creation which possesses all the image range i.e from A to Z and 0-9. The selection of character is made from the number plate as a binary image and after that contrasted with the created templates. Later performing this comparison the most elevated match character is displayed. The increased number of template images is the cause of improved dexterity of OCR.

RESULTS

The RVPR system is applied on the image of the stationary vehicles by utilizing R217a version of MATLAB; image processing toolbox is used which is available in this mentioned version.



Figure 12: Results

This algorithm of number plate recognition is tried on various types of number plates, including dimensional images with different backgrounds lighting condition. This number plate recognition algorithm shows 99% exactness for being fixed angle and stationary images.

Effectiveness Measure

The number plate from the image is easily found and recognized by this system. A measure of effectiveness for capture rate is as follows:

$$\text{capture rate} = \frac{\text{no. of correctly recognized license plates}}{\text{total no. of taken images}}$$

Moreover, the effectiveness of the types of license plates along with their capture rate in percentage are elaborated in mentioned below Table 1.

Table 1: Effectiveness (Recognition)

Type of license plates	Number of images	Correctly recognized license plates	Capture rate in %
Standard license plates	20	19	95
License plates with good contrast	15	15	100
License plates with proper lighting condition	15	14	93.33
License plates with low resolution	15	12	80
Skewed license plates	10	7	70
Non-standard size of license plates	15	13	86.66

Overall, capture rate for the algorithm
Capture Rate = 87.49%

Measure of Effectiveness (Recognition)

Over all read rate for the algorithm is 72.2%.

Similarly, the effectiveness (Recognition) of the types of license plates along with their capture rate in percentage are elaborated in mentioned below Table 2.

Table 2: Effectiveness (Recognition)

Type of license plates	Number of images	Correctly recognized license plates	Capture rate in %
Standard license plates	20	18	90
License plates with good contrast	15	13	86.66
License plates with proper lighting condition	20	18	86.66
License plates with low resolution	15	12	80
Skewed license plates	10	6	60
Non-standard size of license plates	10	5	50

CONCLUSIONS

While working on the images of the parking zone and busy roads, very high accuracy is required in the extraction of Number plate. This supposed method gives 90% contrast dexterity. Firstly, the morphological operation is applied to find the number plate which extracts the plate location then to receive the character from the plate area the segmentation is used. Lastly, each character included in the character segment is recognized by using OCR. Multiple Image processing methods are connected with the record of vehicles available in the database for the identification of vehicles. The vehicle can easily be identified by finding and perceiving the number plate even in the distinct condition of lighting. For the fruitful results in future, the system performs valuable work in a highly restricted zone.

- To improve the accuracy of the system, more evolved image-processing strategies must use.
- Increase the image resolution.

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