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Enhancement and Recognition of Number Plate using OCR Technique

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Abstract: Advances in image processing includes foreseeing the data necessities of Governments, perceiving and following humans and things, diagnosing ailments, performing medical procedure, and programmed driving of all types of transport. The future image processing utilizations of satellite based imaging ranges from planetary exploration to surveillance applications. This paper "Enhancement and Recognition of Number Plate Using OCR Technique" is proposed to distinguish the vehicles by their number plates without direct human mediation. The proposed work is framed into 3 stages: First stage is extraction of number plate from entire assortment of vehicle image; Second Stage is segmentation of characters from the extracted number plate and third stage is to perceive the segmented characters and to show the output result. From the entire input image, just the number plate is detected and processed further using character segmentation. From the extracted number plate, each character is isolated by segmentation in the character segmentation phase. After the segmentation of character, the recognition is done by character recognition phase. The proposed framework is implemented using MATLAB.

Keywords: Extraction, Segmentation, Character Recognition, Bouncing box technique, MATLAB.

I. INTRODUCTION

Image processing can be thought of a type of signal processing for which the input is an image, for example, photos or frames of video. The output of image processing can be either an image or a lot of parameters identified with the image. Most image processing techniques involve treating the image as a two-dimensional signal and applying standard signal handling procedures to it. The acquisition of images is alluded to as imaging. Image Handling manages images which are two-dimensional elements, (for example, examined office records, x-beam films, Satellite images, and so forth.) caught electronically. Vehicle number plate recognition is an advanced image processing technique to recognize vehicles by number plates. Vehicle number plate recognition frameworks are used as traffic control and security applications such as access control, tracking of vehicles. Along these lines it is likewise used to detect, deter and disrupt criminality. It likewise assumes a vital job in electronic payment system (toll payment and parking fee payment).For example in parking, number plates are used to compute the duration of the parking. At the point when a vehicle enters the entryway, license plate is automatically recognized and stored in database. On leaving, the license plate is perceived again and compared with the stored numbers in the database.

The time difference is used for computing the parking fee. Vehicle number plate recognition is helpful and cost efficient as it is computerized. In the proposed methodology, first the input image is proliferated and pre-processed, for example, resizing, filtering, conversion is applied to the image which eliminates all the noise.

Then mathematical morphological operations, for example, erosion, dilation using structuring element are applied on to get edge extracted image. After this, the segmentation is routed to the gained image to processes by applying character segmentation technique based on histogram. At last, template matching is done to perceive the characters and displaying in the notepad. In this paper, section 2 shows the some research works in the area of Image Processing.

The section 3 depicts the strategy and methods used in this paper to enhance, extract, segment and recognize the input images. It additionally introduces the outcomes received by applying different methods, for example, bounding box, Optical Character Recognition. Optical character recognition, frequently abbreviated as OCR, is the mechanical or electronic change of images of composed, transcribed or printed content into machine-encoded content, regardless of whether from a scanned document, a photograph of a document, a scene-photograph (for instance the text on signs and billboards in a landscape photograph) or from subtitle text superimposed on an image (for instance from a television broadcast). Section 4 concludes the proposed work and discuss about the future enhancement.

II. LITERATURE REVIEW

Number plate recognition is the hotspot area of research because of quick advancement of transportation frameworks. It is an image processing technology used to identify vehicles by just their license plates. Number plate identification framework explores an input image to recognize some nearby fixes containing licenses plates.

Bhawna Tiwari et al. discussed about the method for filtering of digits from the vehicle number plate [1]. Dhiraj Y. Gaikwad, Pramod B. Borole, presented an efficient technique for identifying number plate [2].

Prof. Kumthekar A.V et al. designed the system which captures the image of vehicle number plate and these details were used to Raspberry pi processor for authentication [4]. Mahesh Babu K and M V Raghunadh proposed an algorithm that gives an accuracy of around 91.11% [5]. Mrutyunjay. L. Amatya and K.N.Sarvanan, proposed an algorithm to identify the number plate [6]. Muayad Ali Hamood Bakhtan et al. proposed an efficient technique to recognize the number plate [7].

Narendra Singh Tomar et al. discussed the methods used such as extraction, segmentation and recognition of the number plate [8]. Ragini Bhat and Bijender Mehandia proposed an algorithm for Number plate recognition on the basis SVM feature extraction techniques and connected component analysis with a character recognition [9]. P. Surekha et al. proposed an algorithm to obtain the results with an efficiency of 97% [10].

III. METHODOLOGY

The proposed work is framed into 3 stages

A. Extraction
B. Segmentation
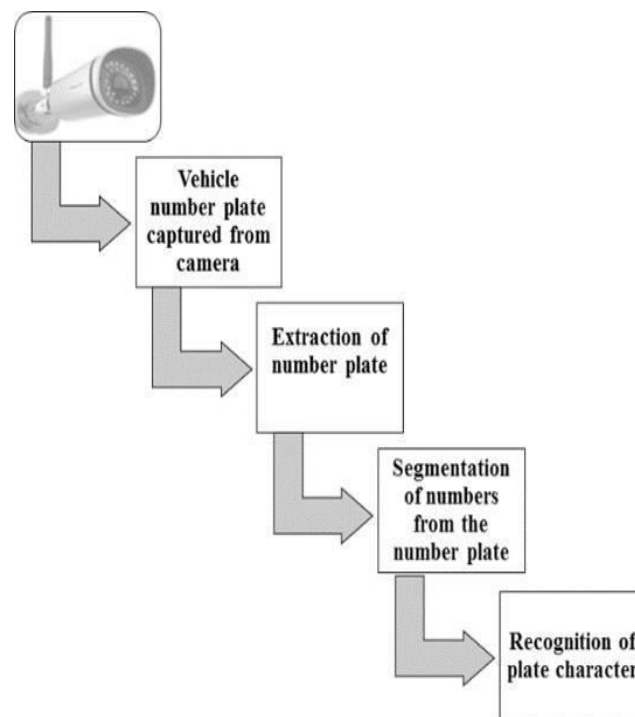C. Recognition of characters

Fig.1. System Block Diagram

The proposed framework is completed using the MATLAB. MATLAB is a general purpose programming language. MATLAB gives numerous functions to image handling and different assignments. The greater part of these functions are written in the MATLAB language and are openly clear as plain content documents. In this manner the implementation details of these functions are available and open to scrutiny. Another preferred standpoint of MATLAB is that it enables one to guarantee maximal numerical exactness in the last outcome.

1) *Extraction:* In this process, firstly the image of a vehicle is obtained.
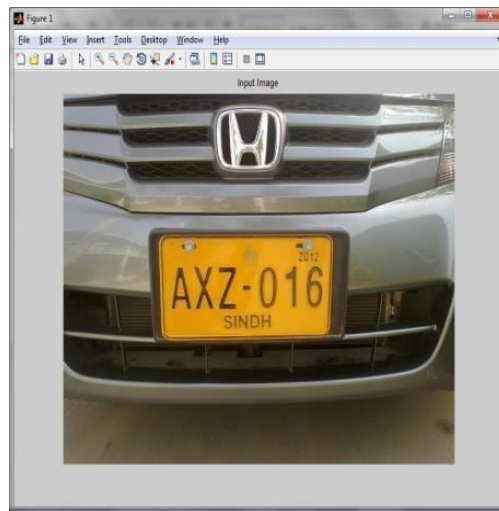

Fig.2. Original Image

Pre-processing is done on input vehicle image to enhance the visibility of image to improve the contrast of the image, enhance the processing speed and to reduce the noise in the image. So as to diminish the issue of low complexity and low quality in vehicle input images, images are enhanced by utilizing median filter on grayscale image. At that point image dilation and erosion is performed on the improved grayscale image by utilizing structuring element. At that point the grayscale image is changed over into black and white image to do further morphological operations to evacuate undesirable noise. The gaps are filled by imfill method and the region of the number plate is distinguished by area opening technique.
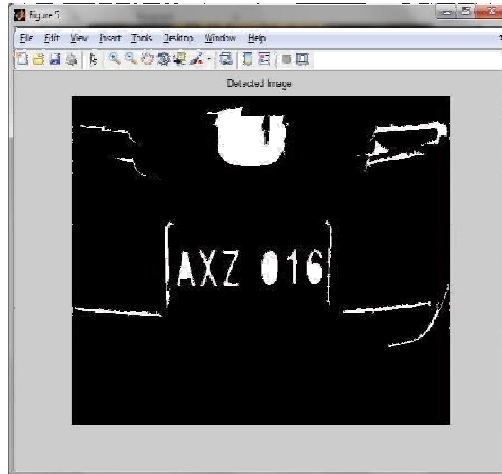

Fig.3. Extracted Number Plate

2) *Segmentation:* Image segmentation is the way towards partitioning a digital image into multiple segments (sets of pixels, otherwise called super pixels). The objective of segmentation is to simplify as well as change the portrayal of an image into something that is progressively significant and less demanding to analyze. Image segmentation is regularly used to locate objects and boundaries (lines, bends, and so on.) in images. In the proposed work, each character of the Number Plate is segmented right off the bat by extracting the desired region properties using bounding box technique. In digital image processing, the bounding box is merely the coordinates of the rectangular border that completely encases a digital image when it is set over a page, a canvas, a screen or other comparative bi-dimensional background. In the obtained coordinates Y width is plotted utilizing histogram plot to discover the frequency and data centers to discover the values of the numbers. These values are then contrasted with the original bounding box values to discover the cell array position of the values and to acquire the *segmented numbers.*

3) *Character Recognition:* Recognition is done through a template matching approach. Template matching is a technique in digital image processing for discovering small parts of an image which match a template image. It tends to be utilized in manufacturing as a part of quality control, an approach to explore a versatile robot, or as an approach to distinguish edges in images. The set of templates previously stored in the database are contrasted with this extracted character set. Correlation coefficient is used to define the relationship between the templates and the character close by. The template onto which the character has the most extreme correlation will be given as output onto the output screen. To perform template matching the extracted characters are resized to 42*24 to normalize it with the characters in the database.
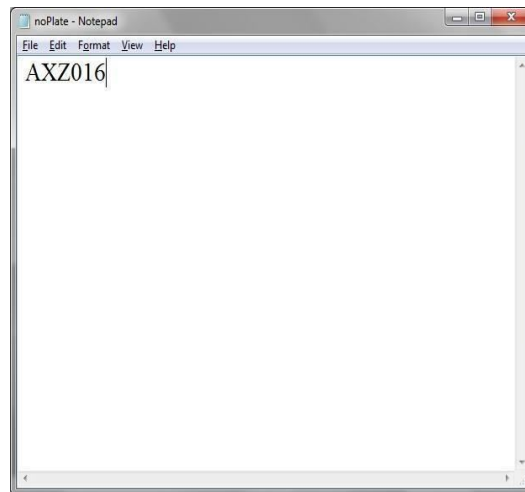

Fig .4. Recognized Number Plate

IV. CONCLUSION

The algorithm effectively identifies the number plate region from the image which comprises of vehicle number and then character segmentation and recognition. The algorithm is applied on numerous images and found that it effectively recognizes the number plate. This paper is proposed remembering the automation of the number plate identification framework for security reason that could supplant the present system of manual entry. This paper is an achievement in recording the number plate of a vehicle despite the fact that it has got its very own restriction of image processing and other equipment necessities. This work can be improved by setting up a camera to catch the moving vehicles and furthermore can be extended to the process that may work with the character recognition as the portable application.

A highly sophisticated sensor coupled with adaptive neural networks based recognition engine can be proposed as a piece of future enhancement work.

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