International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 05 Issue: 08 | Aug - 2021 ISSN: 2582-3930

Vehicle Number Plate Recognition in MATLAB: Using Histogram steps

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Abstract - Vehicle number plate recognition technique is used for extracting an area of number plate from captured vehicle image. We use this technique because as we know there is highly increase in number of vehicles all over the world and it keeps increasing. So for the purpose of law enforcement and traffic management it become difficult to track each and every single vehicle so to overcome this , we need this type of technique. This system is very helpful for traffic police in order to find the details of a vehicle violating the traffic rules. This technique is used for various applications such as automatic toll collection, Border crossings, parking system, Traffic control, stolen cars tracking etc. The technique used in this paper is a histogram based approach which has advantage of simple and fast response as compare to other techniques. In this paper we use various algorithms from distinct edge detection to region of interest extraction.

Key Words: vehicle number plate; region of interest; red green blue

I. INTRODUCTION

With rising number of vehicles on roads, it is getting very difficult to manually handle laws, traffic rules and regulations for smooth traffic moment. identify VNP quickly is beneficial for many businesses and organizations for a variety of applications such as traffic management, automatic payment systems for car parking, stolen cars, security and crime detection. A VNP recognition System is a mass surveillance method that uses character recognition on images in order to read vehicle registration plates in the form of segmented characters. This technique also helps to get the correct result compared to manually one. The main focus of this method is the detection of the region of interest and the identification of the number plate. This whole algorithm work step wise. First VNP image is captured by camera after that image is converted into grey scale for pre processing. Once grey scaling is done after that dilation process start. Dilation help in reducing the noise and add pixels at the boundary of image. After dilatation, the histograms were subjected to horizontal and vertical edge processing, as well as low pass filters.. Low pass filter help in reducing the unwanted region or unwanted noise from the image. After this filtering in fifth stage, image will segment, and ROI has extracted. The advantage of this method is that it can successfully recognise a moving vehicle.

II. METHODOLOGY USED

Methodology is shown in flowchart for detection and extraction of plate.

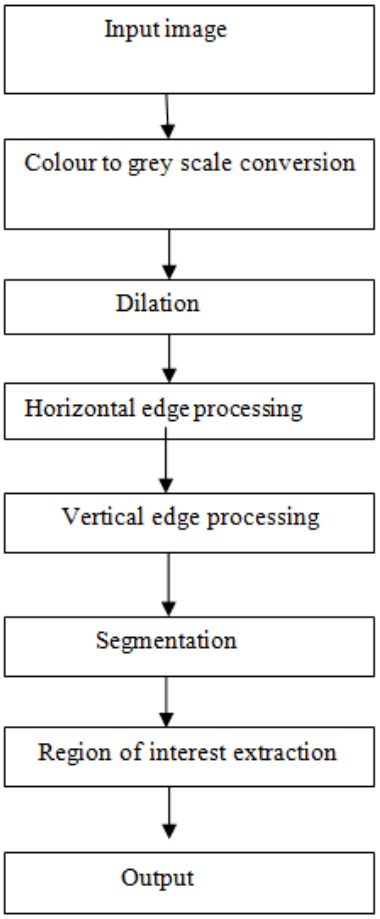

Fig 1. recognition algorithm of vnp

A. Input raw image/image acquisition

In this first step, an image is captured by camera at some fixed angle and taken as an input in RGB form. The quality of image depend on various factors like lighting condition, quality of camera, distance and also size of the vehicle. For a better result, quality of image should be sharp or at high resolution.

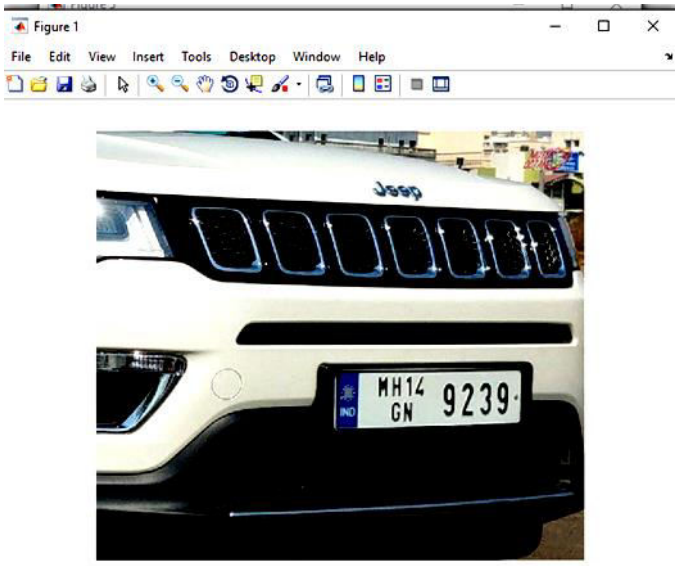

Fig 2. input image

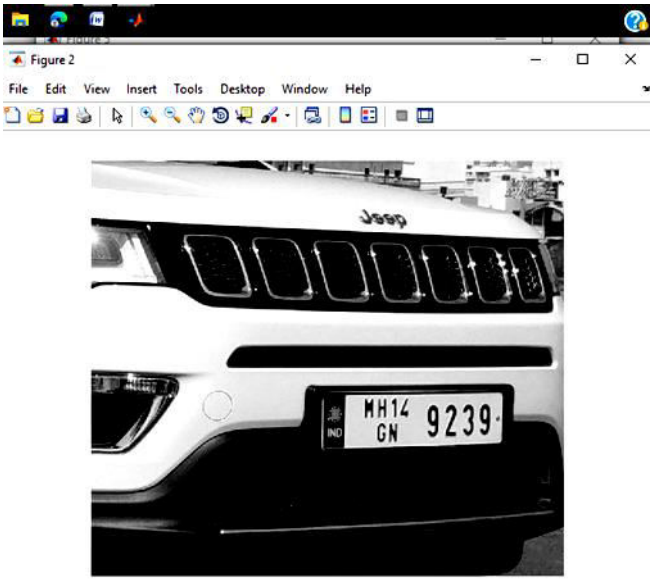

Fig 3. gray scale image

B. Gray scaling of image

This algorithm is independent of the type of colours. In this step coloured RGB image is converted into the Gray scale image in order to reduce colours. Also it help to reduce noise to some extent. If the input image is a colourful image represented by a three-dimensional array in MATLAB, it is transformed to a two-dimensional grey image before being processed further.

C. Dilation

Dilation is an approach to improving the quality of an image by filling holes, adding pixels, and repairing damaged parts in order to sharpen the image's boundaries and improve brightness.

The size and shape of the structuring element used to process the image determines the amount of pixels added or removed from the objects in the image.

By the help of dilation, unwanted noise is reduced at large extent. The grey value difference between neighbouring pixels at an object's edge can be increased by sharpening the edges. This improves edge detection. Also the process of dilation help to nullify losses which occur during grey scaling.

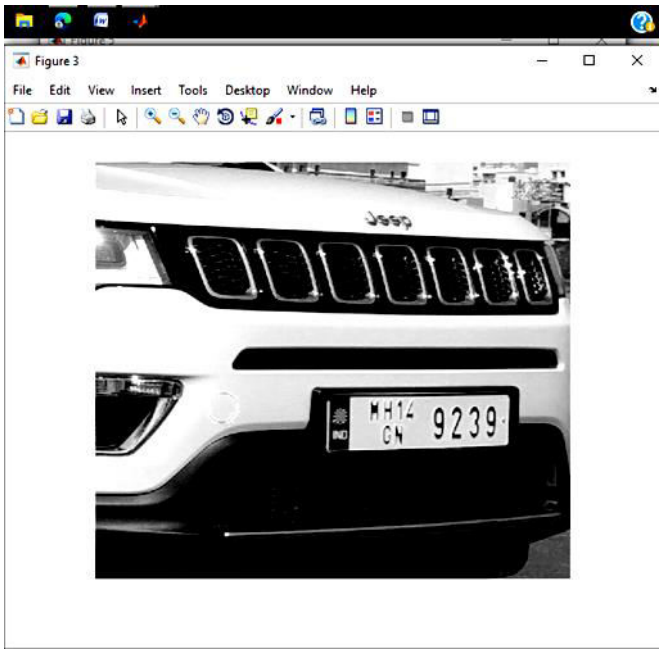

Fig. 4. dilated image

D. Horizontal and Vertical Edge Processing of an Image

In this step, the dilated image from the previous step passes through successive edge processing techniques which are horizontal and vertical edge processing. These histograms show the sum of grey value differences between adjacent pixels in an image, both column and row-wise. First we perform horizontal edge processing to get horizontal histogram. In this algorithm, it moves from each column of the image and work from second pixel from the top of image to get difference between first and second pixel. Similarly, this algorithm moves downward and calculate the difference between second and third pixel and so on. At the end, an array containing column wise is created. A similar procedure is used to determine the vertical histogram.. Instead of columns, rows are processed in this situation.

1. Passing histograms through low pass filter

In the figures number 5 and figure number 6 shown below, we can clearly understood that the histogram values varies drastically between consecutive columns and rows. As a result, filtering out such considerable variation in histogram values is preferred in order to avoid losing valuable information in later stages. The histogram is smoothed by passing it through a low-pass digital filter. This step is

performed by considering the right and left hand side values This procedure is carried out on both the horizontal and vertical histograms. The histogram is shown below in figures 5 and 6 before and after going through a low-pass digital filter.

2. Filtering out Unwanted Areas in Image

After passing the histograms through a low pass filter, an additional filter is used to remove the unacceptable region from the image. Unwanted zones are defined as rows and columns with low histogram values.

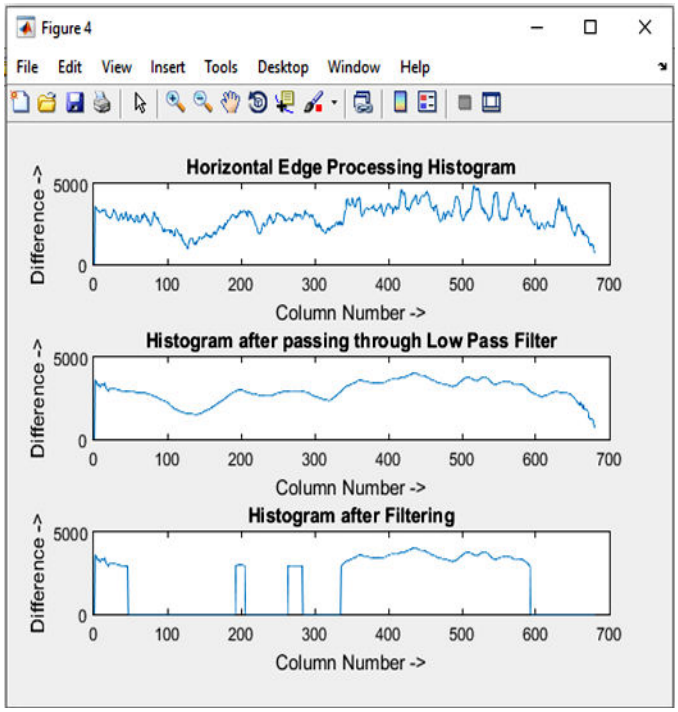

Fig. 5. horizontal edge processing histogram

Because lower histogram values show very less variation with their neighbouring pixels. Because its pixels in the VNP region vary considerably, a histogram with lower values is not required. So, in this process it contain high probability of region containing number plate.

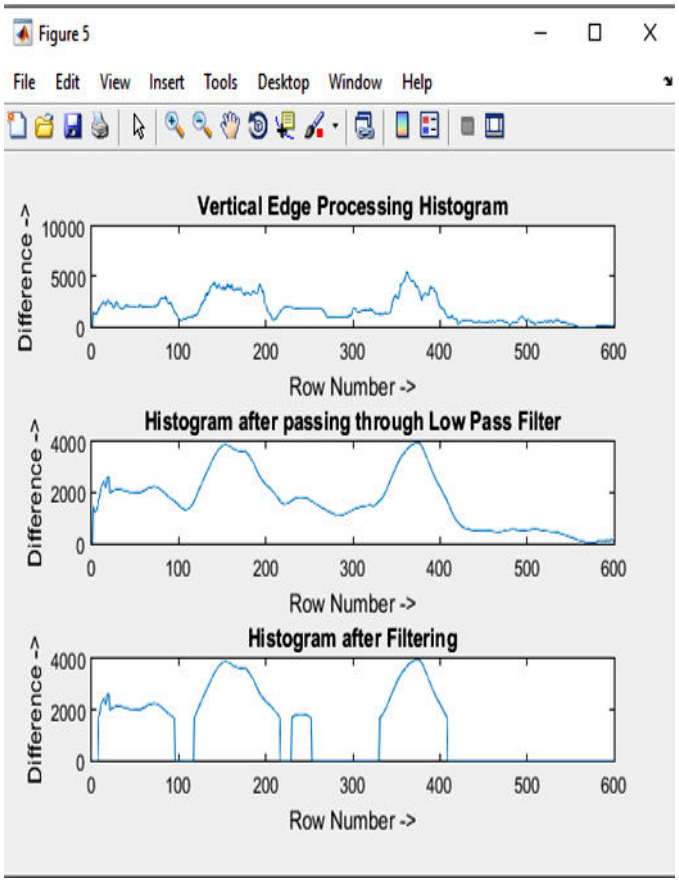

Fig 6. vertical edge processing histogram

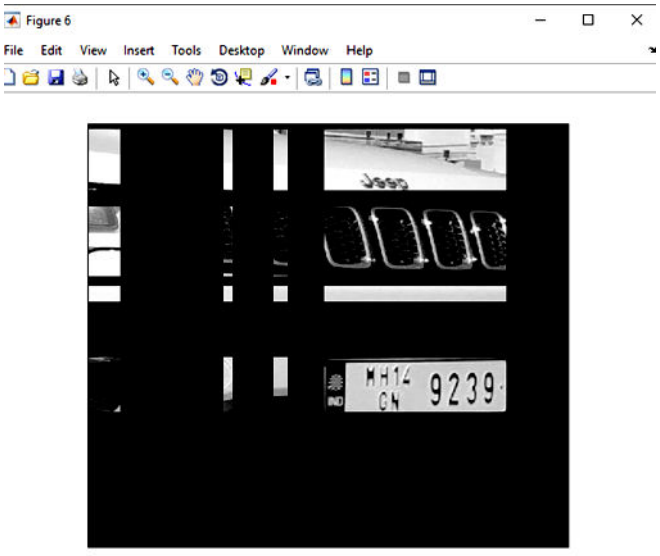

Fig 7. Segmented image

E. Segmentation of Region of Interest

We discover all the regions in an image that have a high possibility of containing a licence plate in this step. The below figure 7 shows the regions having most possibility of license plate.

F. Extraction of region of interest

Going to follow the segmentation process, the region with the maximum histogram value is recognized as the most probable number plate location. To locate a common region with maximum values of the horizontal and vertical histograms, all areas are analysed in rows and columns. The ROI output can be seen in the Figure 8 below.

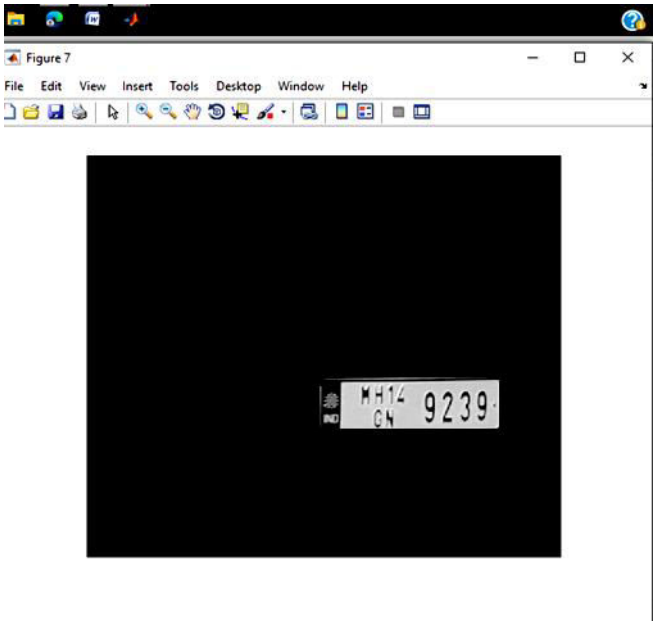

Fig. 8. final output showing vnp

III. ACKNOWLEDGEMENT

The authors thank Mr. Mohd. Imran for providing necessary guidance in conducting this research. Our heartfelt gratitude to our respected Principal and our project in-charge Mr. Ankit Vijayvargia for his encouragement to our project.

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