

Vehicle Number Plate Recognition System Using Morphological Operations

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Abstract - The vehicle number plate recognition system depends on image processing technology. It is one of the most fundamental systems invented to identify the vehicle number plate. In today's environment with the developing quantity of vehicle day by day, it's not potential to manually hold a document of the whole vehicle. With the growth of this vehicle number plate recognition system, it enhances simple to hold a document and manage it whenever needed. The main purpose is to compose an effective vehicle number plate recognition system by using a vehicle number plate. The method first would obtain the image of the vehicle number plate as soon as the vehicle reaches the safety checking region. The obtained images are extracted by applying the segmentation process. Visual character recognition is employed to recognize the signs, numbers, and letters. The method is executed and simulated on MATLAB and performance is examined on original images. This kind of method is extensively utilized in Traffic control regions, toll gates, parking zone, etc. This system is essentially planned for the view of the protection policy.

Keywords: Vehicle Number Plate Recognition, Gray Processing, Image Acquisition, Image Binarization, Template Matching

I. INTRODUCTION

Vehicle Number plates are utilized for the recognition of vehicles all over the countries. Vehicles are recognizing both manually or automatically. Automatic vehicle Number plates identification is an image processing system for recognizing motor vehicles by number plates. Automatic vehicle number plates systems are utilized for the objective of efficient travel handle and safety applications such as access handle to secured regions and tracking of desired vehicles. Vehicle number plate recognition (VNPR) is an easier method for Vehicle recognition.

VNPR system for the Indian vehicle license plate corresponds to the other country license plate as there is no standard supported for the aspect rate of the vehicle license plate. The processing scheme in VNPR systems consists of 3 stages: vehicle license plate localization (VLPL), number plate character segmentation, and optical character recognition.

VLPL examines all of the pixels of an image to identify and surround the area of a number plate. Number plate character segmentation is the stage where identification and division of individual character on a number plate happens. Optical Character Recognition receives the number's, letters information, validates, and encodes it to an ASCII number as a letter or number. The step which is relevant and applies the most maximum processing time is that of VLPL.

This proposed paper offers a new VLPL algorithm based on morphological processes with a huge and reliable detection rate appropriate for inexpensive cost devices such as Raspberry Pi, Odroid or any additional embedded

platform. The algorithm is faster compared to existing systems because it does not accept the conventional edge detection techniques, which depend on matrix arithmetic, but instead of a morphological Top-hat process based on fundamental similarities within a grey scale image. The algorithm highlights the vehicle license plate area, matches it to the background image, whereby explaining the detection method. The morphological process employs a basic element to identify and match patterns within a number plate image. The foremost variation among the present and previous VLPL methods are that early methods utilize a basic element with a random preferred size and dimensions that relied on no calculations of patterns with an image. This lack of optimization outcomes in low accuracy and these deficiencies are succeeded by our extended VLPL. We developed an algorithm with basic elements that identify suitable structural outlines within an image and result in enhanced efficiency despite environmental challenges such as information and plate orientation.

II. METHODOLOGY

The working of the full VNPR system can be divided into two segments; they are the hardware segment and the software segment.

Software Design: The first and most fundamental part of this method is software design. The software design works with image processing technology. The applications are executed in MATLAB. The algorithm is classified into the following parts: Capture an image, Pre-processing, Plate area extraction, Segmentation of character in the extracted vehicle number plate, Character

identification, Association with the database, etc. and Show the result.

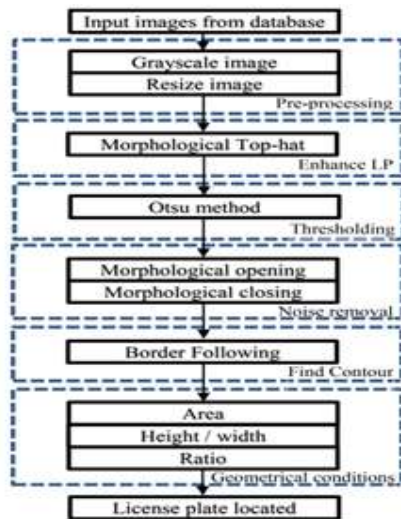


Fig. 1 Developed vnpr.

Hardware Design: The hardware design consists of a microcontroller for guiding the complete hardware of the VNPR system. The VNPR algorithm accepts the image and processing the image on pc, which allows the vehicle number plate.

III. WORK FLOW PROCESS

Blocks of overall VNPR system are explained below:

1. Vehicle Number Plate Obtained By Camera

The captured image of the vehicle number plate is to be recognised using a camera of 4.2 megapixels.



Fig 2: Captured Image of the vehicle.

2. Extraction of Number Plate Section

In this step, the vehicle number plate is removed by firstly changing RGB Image i.e., the obtained image to Grey Scale Image. Here numerical morphology is utilized to identify the area and Sobel operator is utilized to estimate the threshold value. After this, we accept an expanded image. Then the infill function is utilized to fulfill the difficulties so that we can get a pure binary image.

3. Segmentation and Recognition of Number Plate Character

Here bounding box system is used for segmentation. The bounding box is used to measure the characteristics of the image area. The basic step in the identification of the vehicle number plate system is to detect the number plate dimension. Here the segmented image is increased with the greyscale image so that we can only get the vehicle number plate.

4. Display Vehicle Number Plate

After complete the above steps, the vehicle number plate are advertised in the MATLAB output window.

IV. EXPERIMENTAL RESULTS

This section shows the simulation outcomes of the expanded VNPR system. Distinct images of vehicles may be several colours and structure examples are taken and stored in PC. The screenshot of the simulation and are publicized below.



Fig 3: Grey Scale image.

The input image of number plate of vehicle captured by a camera to the system. Converting RGB image to grey-scale image, in order to promote the number plate extraction and improve the processing speed.



Fig 4: Binary gradient image with sobel edge detector.

The binary gradient mask displays lines of large contrast in the image. These lines do not completely describe the outline of the object of interest. Compared to the original image, holes in the lines are recognized that encompasses the thing in the gradient mask.



Fig 5 :Binary Image with filled holes.

The field of interest has been happily segmented, but it is not the only thing that has been detected. Any things that are attached to the edge of the image can be separated using the MATLAB function.



Fig 6: Number plate of Vehicle image.

To get the only vehicle number plate region in an image with characters and numbers that are present on it, the segmented vehicle image is multiplied with grey scale image.

V. CONCLUSION

We have completed a vehicle number plate recognition system. Our proposed algorithm strongly detects the

number plate area from the obtained image which consists of vehicle number and character segmentation, identification. We have implemented our algorithm on several images and found successfully identification. The project was devised holding in mind the vehicle number plate detection system for safety reason that could substitute the current system of standard entry.

In this proposed system, application software is designed for the detection of the vehicles number plate. At first plate, area is extracted applying morphological process then separated the plate characters alone by segmentation. Certainly, template matching is used with the correlation for identification of plate numbers and letters.

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