

An Approach for Detection of Indian Number Plate Segmentation

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Abstract

License Plate Recognition (LPR) is a real time embedded system which automatically recognizes the license number of vehicles. In this Project, the task is implements a number plate localization and recognition system for vehicles in India. The system can recognize single and double line number plates under widely varying illumination conditions. They systems basically consist of 3 main processing steps such as: Detection of number plate, Segmentation of plate characters and Recognition of each character. The system is based on digital images; it recognizes the number plate written in Indian standard format.

Keywords - License plate, License Plate Recognition (LPR), Preprocessing, Character Segmentation

I. INTRODUCTION

Number plate recognition is a technology based on computer vision which involves image processing, fuzzy logic and many other techniques. The Vehicle Identification Number (VIN) is a unique identification number for every car manufactured. Unlike registration number, license plate number does not change throughout the lifetime. Moreover, the registration number is not unique to a car since it can be carried forward to another car. Number plate recognition systems have wide range of application such as traffic maintenances, tracing stolen cars, automatic electronic Toll collection system and many more. But

the main aim is to control the traffic management system. Law enforcement agencies throughout the nation are increasingly adopting license plate recognition technologies to enhance their enforcement and investigative capabilities, expand their collection of relevant data, and expedite the tedious and time consuming process of manually comparing vehicle license plates with lists of stolen, wanted, and other vehicles of interest. Since the 21st century, with social development and improvement of living standards, the number of vehicles is continuously increased, the traffic conditions is worsening, which brought huge pressures to the society and environment. License plate recognition system can solve the various road problems generated by the traffic congestion, thus receiving more and more attention The vehicle license plate recognition system focuses on the key technologies, which include the license plate region location, license plate character extraction and license character segmentation, license plate character recognition. For different countries the type of license plate, characters used in the plate, climatic conditions vary so to cope with this we should establish a good license plate recognition system with higher performance and accuracy rate. But the recognition step mainly relies on the accuracy rate of the character segmentation. Thus we should strengthen the character segmentation step with more powerful and efficient algorithm. One algorithm could work very well for a given country's plate but very poorly for another. So based upon our requirement we should select the algorithms.

In this paper, we proposed a method mainly based on edge detection and morphological operation and reduce the noise using mid-filtering noise removal method.

Applications:



Figure 1. Vehicle Number Plate Recognition Systems

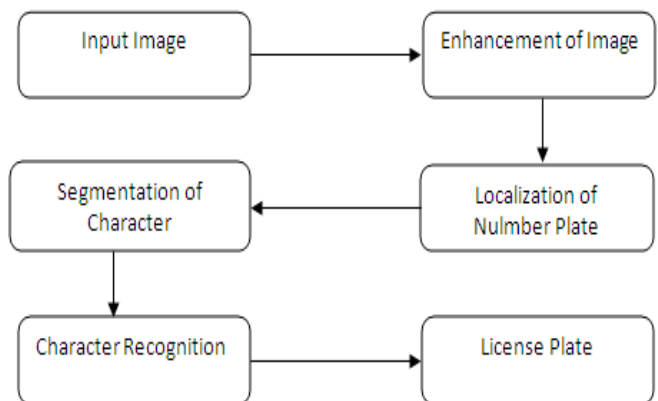
II RELATED WORKS

Much License plate detection, segmentation techniques have been proposed to implement License Plate Recognition System. They algorithm can mainly classify in few things like edge-based, color base and texture based.

III PROPOSED METHOD

Number plate is a pattern with very high variations of contrast. If the number plate is very similar to background it's difficult to identify the location. Brightness and contrast is changes as light fall changes to it. In this paper the morphological operations are used to extract the contrast feature within the plate. The work is divided into several parts:

- A. Input Raw Image
- B. Enhancement of image
- C. Localization of Number Plate
- D. Character Recognition
- E. Extract License Plate



A. Input Raw Image

Input the image that is taken from the car and bike



Figure 2.(a)



Figure 2.(b)

Figure 2 (a) and (b) Sample Input Image

B. Enhancement of image

Histogram Equalization is used to enhance the contrast of the image for better functioning. The function used to enhancement that is $J = \text{histeq}(k)$; histeq enhances the contrast of the images by transforming the values in an intensity image.

When image pixel intensity of 4-neighbourhood and 8-neighbourhood connectivity, we supply a desired histogram, then histeq chooses the grayscale transformation T to minimize

$$C_1(T(k)) - C_0(k)$$

In below figure, we state the change of histogram from input image and after applying the contrast enhancement using histogram equalization.



Figure 3. 4-neighbourhood and 8-neighbourhood

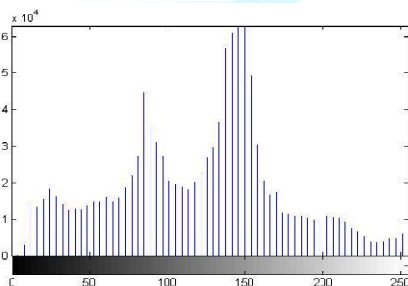


Figure 4. Before contrast enhancement

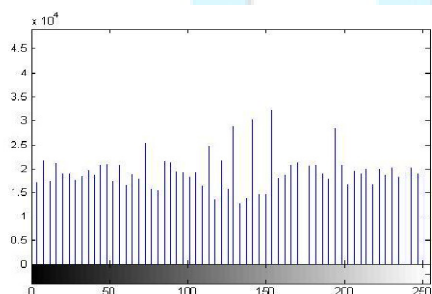


Figure 5. After contrast enhancement

C. Localization of Number Plate

Objective of this process, to localize potential license plate region(s) from the vehicle images captured through a camera and interpret them using an Optical Character Recognition (OCR) system to get the license number of the vehicle. Convert Grayscale image applying “Sobel” edge detection method. After removing lower pixels. After filling the “holes” image after removing components with connectivity less than 1000 pixels. Locate the number plate after morphological filtering.

D. Segmentation Character

In preprocessing is strengthened before segmentation stage to improve the accuracy of the character segmentation. Projection based method to segment the characters according to the prior knowledge of the license plate.

E. Character Recognition

This process is designed on the basis of Indian License Plate specifications and hence has characteristic features which can be taken into analysis. The back ground color is either yellow or white and the character written with block letters. Total number plate consist of 8-10 characters. First two letters and fifth & sixth character always character (A-Z). Remaining letters are numbers (0-9).

F. Extract License Plate

MATLAB toolbox function provides a function called region props(). It measures a set of properties for each labeled region in the label matrix. We use boundingbox to measure the properties of the image region. After labeling the connecting components, the region will be extracting from the input image.

IV RESULT

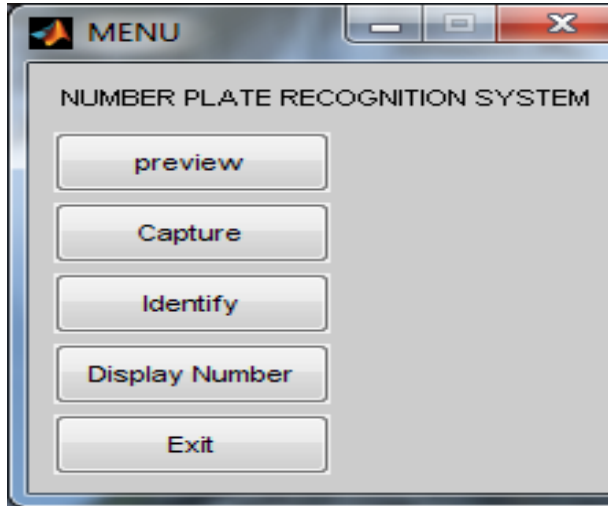


Figure 6. Initial Process of Number Plate Recognition.(Double Line)

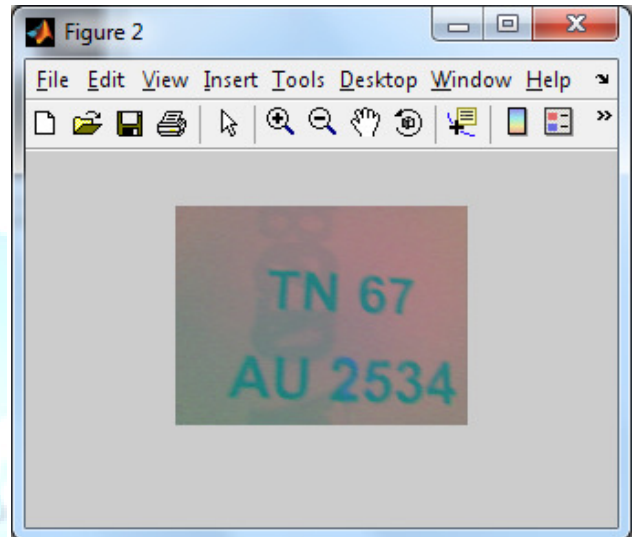


Figure 6.2. Capturing the Vehicle Number Plate. (double line)

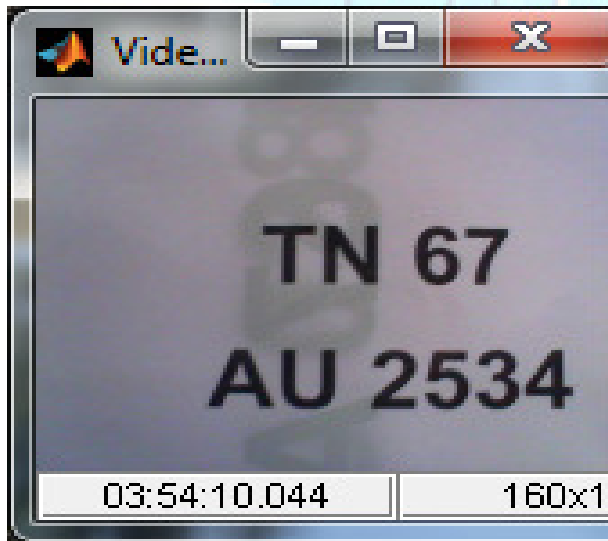


Figure 6.1. Video Playing in the Vehicle Number Plate. (Double Line)

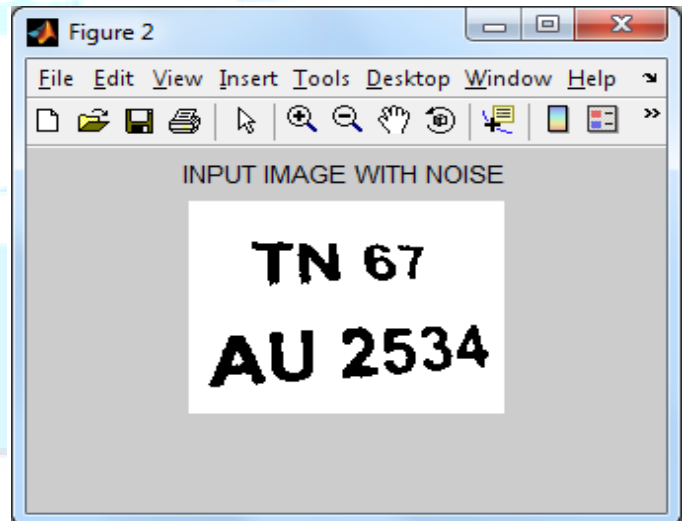


Figure 6.3 Input image with noise in number plate. (Double Line)

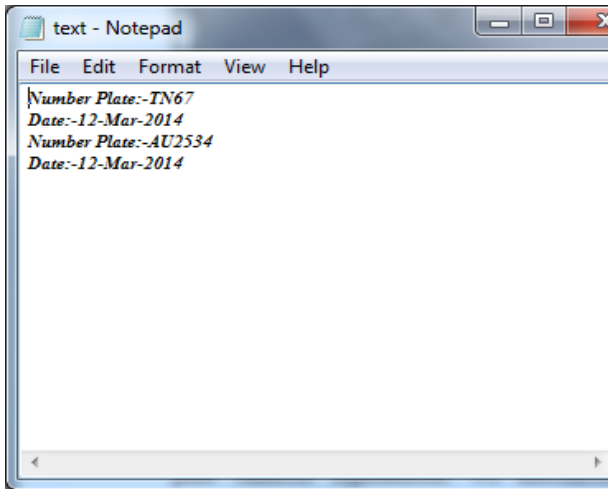


Figure 6.4 Final output in notepad.
(Double Line)

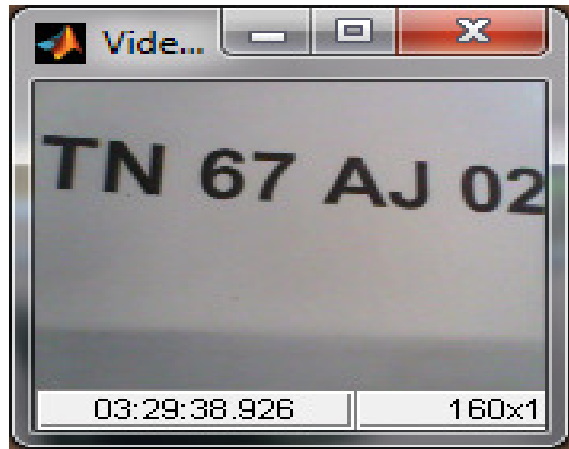


Figure 6.6 Video Playing in the Vehicle Number Plate. (Single Line)

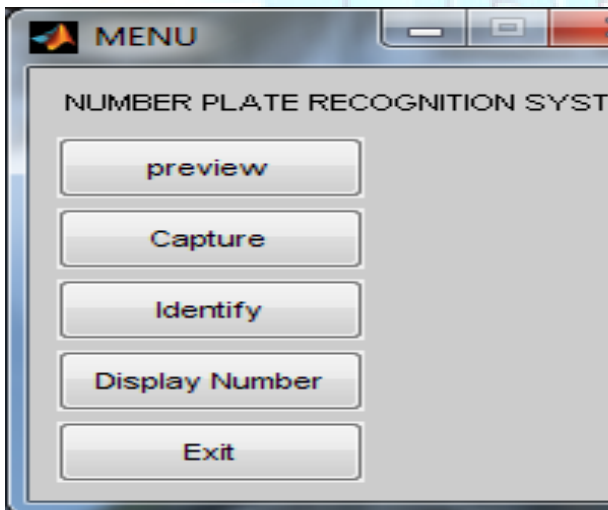


Figure 6.5 Initial Process of Number Plate Recognition(Single Line)

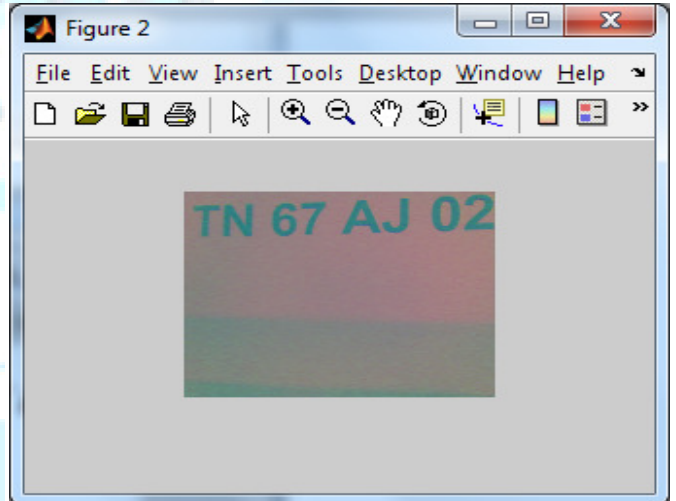


Figure 6.7 Capturing the Vehicle Number Plate. (Single Line)

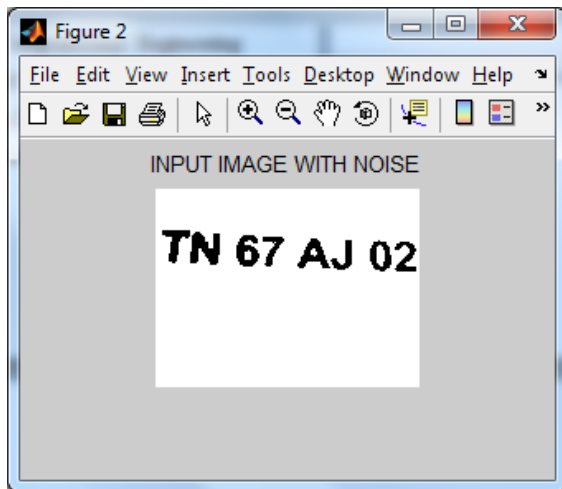


Figure 6.8 Input Image with Noise in Number Plate (single line)

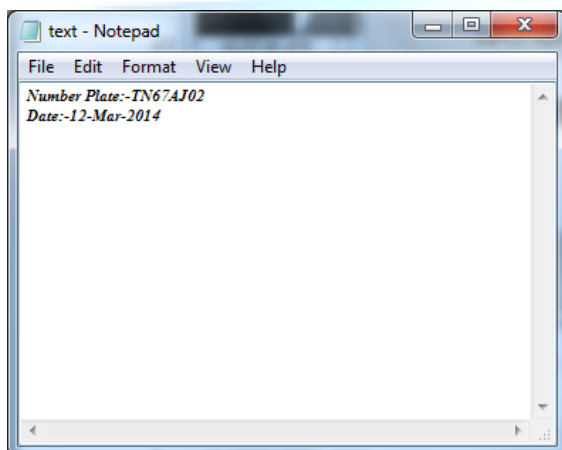


Figure 6.9 Final output in notepad (single line)

V CONCLUSION

In this paper presents various algorithms for license plate character segmentation. We introduced a method of extracting specific features of the Indian vehicle license plates and increase its accuracy and speed in recognizing number plates.

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