IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Vehicle Number Plate Recognition System

T. AARTHY
Master of Computer Application
Coimbatore Institute of Technology
Coimbatore, Tamil Nadu, India

B. RISHOP
Master of Computer Application
Coimbatore Institute of Technology
Coimbatore, Tamil Nadu, India

M. SUBASH
Master of Computer Application
Coimbatore Institute of Technology
Coimbatore, Tamil Nadu, India

Dr.J.B.JONA, Associate Professor

Department of Computer Application
Coimbatore Institute of Technology
Coimbatore, Tamil Nadu, India

1. ABSTRACT:

In the era of fast-growing technologies, there is a huge demand among people for a comfortable lifestyle and travel. In the last few years, the number of vehicles on road has been explosively grown. With the increasing growth in the vehicular sector every day, the need to track individual vehicle becomes a very challenging task. The proposed project illustrates a design and development of a new efficient Vehicle Number Plate Recognition System, using image processing technology. This technology is used in various security and traffic applications. This system is implemented at residential parking entries. It aims to recognize number plates using OpenCV and to identify number plates to extract characters and digits. The objective is to increase the safety of vehicles. This technology assists in a criminal investigation and prevents the crime.

Keywords: *Image processing, OpenCV*

2. INTRODUCTION

Due to the increasing number of vehicles nowadays, the modern city needs to establish the effective and efficient automatic traffic system for the management of the traffic law enforcement. Number plate recognition leads the significant role in this condition. The number plate recognition is an image processing technique to extract the image of number plate on vehicle taken by digital camera or taken by either a color or a grayscale digital camera, as well as an infrared camera in order to identify the vehicles using their number plate. The Number Plate Recognition system recognizes characters on number plate through the combination of various techniques including image processing, predict characters, character segmentation and recognition. It consists of a camera to detect the number plate object and processing unit to process and extract the characters and interpret the pixels into numerically readable characters. The Number plate recognition task is quite challenging from vehicle images due to the view point changes, when vehicle bodies and license plate have similar color, multi style plate formats, and the non-uniform outdoor illumination conditions during image acquisition. These systems are based on different methodologies but still it is really challenging task as some of the factors like high speed of vehicle, non-uniform vehicle number plate, language of vehicle number and different lighting conditions can affect a lot in the overall recognition rate. Most of the systems work under these limitations. In this paper, different approaches of VNPR are discussed by considering video size, success rate and processing time as parameters. Machine learning approaches the problem in a different way. The idea is to take a large number of number plates, known as training data and then develop a system which can learn from those training examples. In other words, the machine learning uses the examples to automatically infer rules for recognizing number plate.

With the rapid development of highway and the wide use of vehicles, people have started to pay more and more attention on the advanced, efficient and accurate intelligent transportation systems (ITSs). As it is not possible to judge which approach is better, different papers, which are based on steps mentioned in Fig.1, are surveyed and categorized based on the methodologies in each approach. For each approach whenever available parameters like speed, accuracy, performance, video size and platform are reported. Commercial product survey is beyond the scope of this as sometimes these products claim more accuracy than actual for promotional purposes.

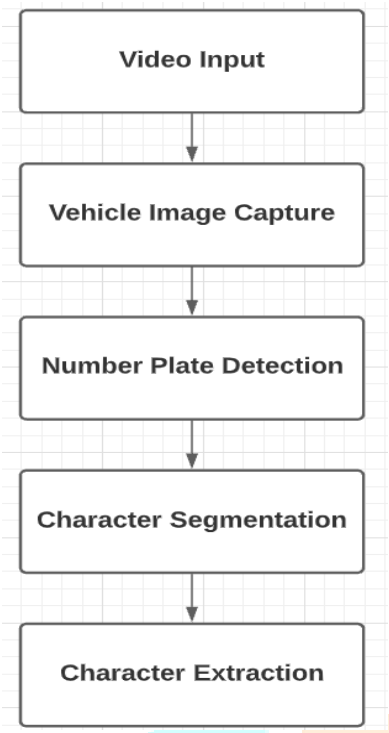

Fig.1. Conventional VNPR System

3. LITERATURE STUDY

Vehicle license plate recognition has been active research for the past few years. This paper aims to automate the process of license plate recognition. There are several systems already in place however, varying illuminations have been tested in [1][2][5][6] and [7], but have achieved efficiency of only 84.8%, 88.71%, 80.8% and 90% respectively. The highest efficiency being 90% in
[7] has a dataset consisting of only 20 images. While the others have a large dataset, their accuracy is poor. If characters are incorrectly segmented, the Optical Character Recognition (OCR) would be affected and accurate results will not be achieved. Algorithms such as connected component methods in [1][2][6][7] and horizontal projection in [3][4] are used for the purpose of segmenting.

The other papers listed in the references makes use of OCR based on template matching method in order to predict. These systems have been executed for specific font styles only. License Plate Recognition becomes easy if executed on standard plates, however with different countries, the stroke width and the size of the plate vary. Therefore, it becomes necessary to tackle such issues at places where there aren't any strict rules and /or regulations aren't followed. All theoretical studies have explored Automatic License Plate Recognition System using standard processing algorithms and template matching method for character recognition. With the existence of image processing, the use of the techniques has been found amongst the recent literatures.

4. METHODOLOGIES

Flow chart of (VNPR) Vehicle Number Plate Recognition System

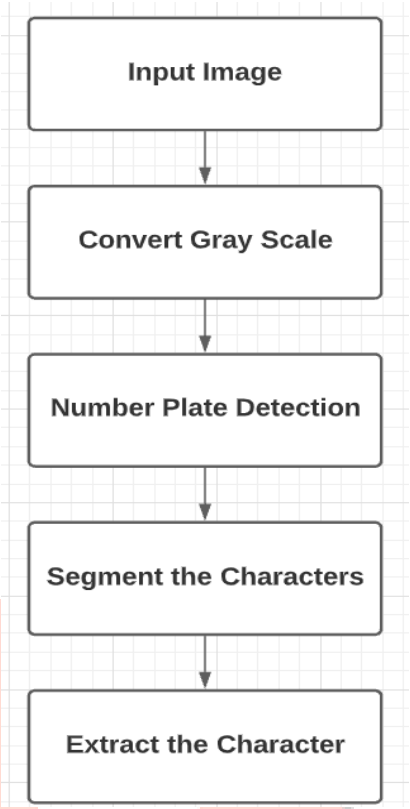

Fig.2. Flowchart of VNPR system

4.1 CAPTURING THE INPUT IMAGE

The image of the vehicle whose number plate is to be identified is captured using digital camera of 5.0 megapixel.

Fig.3. Original Image

4.2 CONVERTING GRAY SCALE IMAGE

Color components like red, green and blue value are not used throughout the VNPR procedure. So, if the input image is a colored image represented by 3dimensional array in MATLAB, it is converted

to a 2-dimensional gray image before further processing.

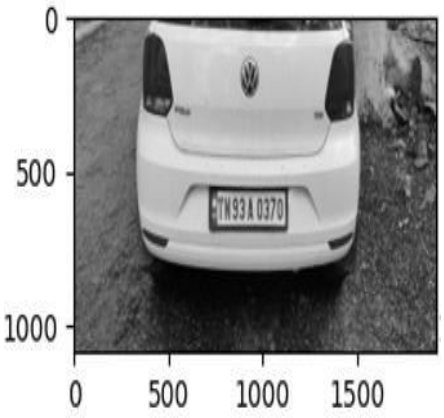

Fig.4. Gray Scale Image

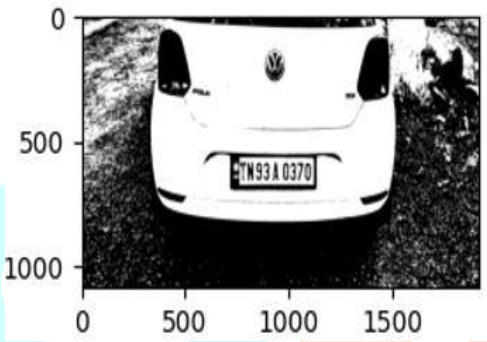

Fig.5. Binary Image

4.3 NUMBER PLATE DETECTION

Most of the number plate detection algorithms fall in more than one category based on different techniques. To detect vehicle number plate following factors should be considered:

(1). Plate size: a plate can be of different size in a vehicle image.
(2). Plate location: A plate can be located anywhere in the vehicle.
(3). Plate background: A plate can have different background colors based on vehicle type. For example, a government vehicle number plate might have different background than other public vehicles.

4.4 SEGEMENTATION AND EXTRACTION OF NUMBER PLATE

The next step is to find all the regions in an image that has high probability of containing a number plate. In this step the number plate is extracted by firstly converting RGB Image i.e., the captured image to Gray Scale Image and then to binary image. After this rotate the image to 360 degrees. Then take a gray scale pixel range between 0 and 1, multiplying it with 255 and finds the connected regions and groups them together. Get the bounding box coordinates with region height and width. Ensure the condition of a typical license plate and patch over these regions. Using the patch, the number plate gets extracted.

5. DATASET PREPARATION

First step is to create a folder named train20x20; this train folder should consist of subfolders with images of numbers and alphabets, similarly for the validation.

Fig.6. Organization of alphabet dataset

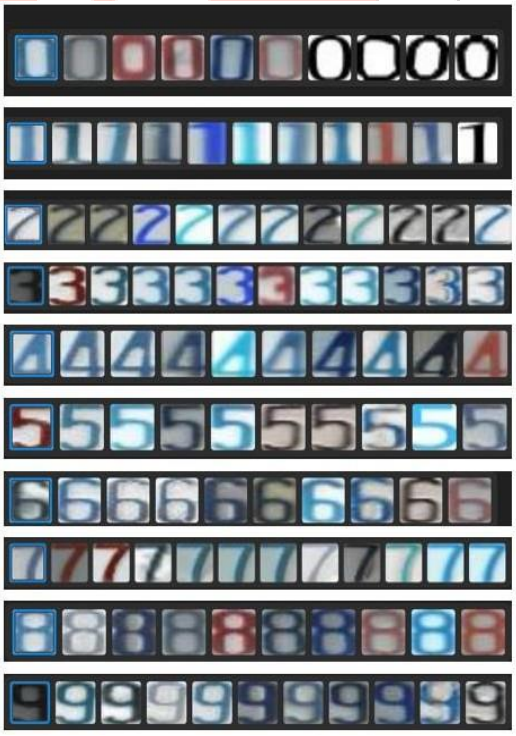

Fig.7. Organization of number dataset

6. IMPLEMENTATION

In general words, first the license plate is recognized in the input video. Then perform character segmentation i.e., separating the characters from the plate recognized. Take the video as input and stores it by frame by frame. Convert the image to grayscale. Select the bounding box satisfying the assumption and the list selected bounding boxes is sent as input for character segmentation.

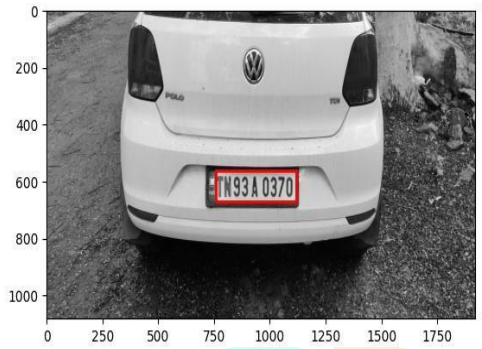

Fig.8. Segmented Number Plate

Fig.9. Extracted Number Plate

7. RESULTS AND DISCUSSION

This proposed approach for number plate extraction work well for all types of input images. Total 70 vehicle images are tested. Images are taken in different illumination conditions. The images are taken at different distances relative to camera and are of different colors and different size images. The proposed method works well for low contrast, noisy and low-resolution images.

8. CONCLUSION

In this paper, an efficient approach for vehicle number plate extraction is presented on this project. The proposed method is mainly designed for real-time Indian vehicles number plate but it also works well for foreign number plates. This extraction process works well for low resolution, noisy, and low contrast images. This method is tested for number of vehicle images under different weather illumination conditions i.e., daytime, night time, sunny, cloudy, rainy days etc and success rate achieved.

REFERENCES

[1] N. Saleem, H. Muazzam, H.M. Tahir and U. Farooq, “Automatic License Plate Recognition using Extracted Features”, Proceedings of 4th International Symposium on Computational and Business Intelligence, pp. 221-225, 2016.

[2] R. Islam, K.F. Sharif and S. Biswas, “Automatic Vehicle Number Plate Recognition using Structured Elements”, Proceedings of IEEE International Conference on Systems, Process and Control, pp. 44-48, 2015.

[3] P. Prabhakar, P. Anupama and S.R. Resmi, “Automatic Vehicle Number Plate Detection and Recognition”, Proceedings of IEEE International Conference on Control, Instrumentation, Communication and Computational Technologies, pp. 185-190, 2014.

[4] J. Chong, C. Tianhua and J. Linhao, “License Plate Recognition based on Edge Detection Algorithm”, Proceedings of 9th IEEE International Conference on Intelligent Information Hiding and Multimedia Signal Processing, pp. 395-398, 2013.

[5] K.M. Hung and C.T. Hsieh, “A Real-Time Mobile Vehicle License Plate Detection and Recognition”, Tamkang Journal of Science and Engineering, Vol. 13, No. 4, pp. 433-442, 2010.

[6] A. Puranic, K.T. Deepak and V. Umadevi, “Vehicle Number Plate Recognition System: A Literature Review and Implementation using Template Matching”, International Journal of Computer Applications, Vol. 134, No. 1, pp. 12-16, 2016.

[7] P. Sai Krishna, “Automatic Number Plate Recognition by using Matlab”, International Journal of Innovative Research in Electronics and Communications, Vol. 2, No. 4, pp. 1-7, 2015.

[8] C. Arth, C. Leistner, and H. Bischof. TRIcam: An Embedded Platform for Remote Traffic Surveillance. In Proceedings of the IEEE Conference on Computer Vision and Pattern.

[9] Openalpr: License plate recognition. https://github.com/openalpr/openalpr.