



Number Plate Recognition for Moving Vehicles

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ABSTRACT: Video surveillance system is used for security purpose and monitoring systems. Detection of moving object is challenging part of video surveillance. Video surveillance system is used for home security, military applications, banking/ATM security, traffic monitoring etc. Now a days due to decreasing costs of high quality video surveillance system, efficient recognition of illegally parked vehicles is totally human operators dependant. The detection of vehicles by their number plates is most interesting and challenging task due to different plate format, different language characters, rotations, different size of plates, backgrounds and different lighting conditions during capturing the image. Proposed system consist of an input image is pre-processed through many operations such as RGB to GRAY image conversion, filtering operation etc. A number plate image captured by webcam is taken as input image. Here Wavelet is used for feature extraction and support vector machine is used for classification and recognition.

KEYWORDS: MATLAB,Image processing,Artificial neural network,Wavelet,Back propogation algorithm.

I. INTRODUCTION

Number plates are used for identification of vehicles all over the world. Vehicles are identified either manually or automatically. For automatic vehicle identification an image processing technique is used to identify vehicles by their number plates. Automatic vehicle identification systems are used for effective traffic control and security applications such tracking of wanted vehicles. A vehicle plays an important role in transportation. Control of such huge traffic has become very difficult problem.

The problem of automatic NPR recognition has been studied since 1990. The most common approach for NPR includes texture, colour feature, edge extraction, combining edge and colour, morphological operations. Number plate recognition has become important in intelligent traffic system. It is also used for control of vehicles in societies and mall parking.

Each vehicle has a unique identification number so its owner can be easily identified. Hence, it is useful in anti-theft activities and security purposes in societies. A typical number plate recognition system consists of capturing of image from webcam, noise removal, image equalization segmentation, feature extraction, character recognition.

II. LITERATURE SURVEY

- 1. Shen Zheng Wang & His-Jian Lee,"Detection and Recognition of License Plate Characters with Different Appearances", IEEE Intelligent Transportation Systems, Proceedings, vol. 2, PP 979-984, 2003.**

This system proposes an approach to develop automatic license plate recognition system. To detect license plate region magnitude of vertical gradient is used. The geometric features like width and height ratio are used to find that region. [1]

- 2. Humayun Karim Sulehria, Ye Zhang, Danish Irfan, AtifKarimSulehria, "Vehicle Number Plate Recognition Using Mathematical Morphology and Neural Networks", WSEAS Transactions on Computers, Vol. 7, Issue 6, PP 781-790, June 2008.**

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They states that the purpose of this paper is to design a system that can recognize vehicle license plate under poor environmental conditions by using neural network. Adverse environmental condition may refer to the image has been blurred by poor lighting, rain, poor image resolution and haze which make the image not clear.[2]

3. Er.P.K.Suri,Dr. Ekta Walia, Er. AmitVerma,” Vehicle Number Plate Detection using Sobel Edge Detection Technique, IJCST, Vol. 1, Issue 2, December 2010.

They proposed a Vehicle Number Plate Detection system using Sobel Edge Detection. They does pre-processing for image enhancement at first. Some regions are candidate as a license plate during three procedures. Finally considering geometrical features, the license plate is segmented nearly independent of image capturing conditions.[3]

4. Christos Nikolaos E. Anagnostopoulos, Ionnis E. Anagnostopoulos,Ioannis D. Psoroulas, Vassili Loumos and Eleftherios Kayafas, ”License Plate Recognition from Still Images and Vedio Sequences ”, IEEE Transactions on Intelligent Transportation Systems, Vol. 9, No. 3, PP 377-391 September 2008.

They surveyed that the task for extraction of number plates is very challenging due to difference in plate formats and nonuniform illumination conditions during image acquisition step.[4].

III. PROPOSED WORK

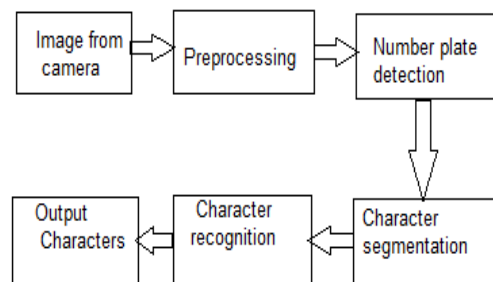


Fig.1. Number Plate Recognition System Flow.

Proposed system consists of following steps: Input image from webcam, Preprocessing, Number plate detection, Character segmentation, Character recognition, output of character as shown in figure.1.

3.1. Image Acquisition -The image of the vehicle whose number plate is to be identified is captured using webcam.

3.2. Preprocessing- Image preprocessing is used before any processing on the image for improving its quality In image processing many operations are performed on the original image such as RGB to GRAY conversion, filtering, binarization etc.

3.2.1. RGB to GRAY conversion- In this, color image is converted into gray scale image. For this, different color transformations are used. In gray processing, the gray values of pixel is calculated according to R,G and B value in the image and obtain the gray scale image at same time. The MATLAB command `rgb2gray` converts RGB values to GRAY scale values.

3.2.2. Filtering- Filters are used for removing the noise. Input image contains lots of noises. The system efficiency is greatly affected by such noise. Hence removal of noise is necessary.

In this system, median filter is used. It is a special type of low pass filter which replaces centre pixel with median values.

3.3. Segmentation- Image segmentation is process of partitioning a digital image into multiple segments (set of pixels, also known as super pixels). This step divides the image into many sub-regions and extracts the regions that are necessary for further analysis.

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Blob extraction, edge detection, bounding box and Hough transformation these are some of segmentation methods. The proposed system uses bounding box segmentation method. The characters are segmented depending on these indices. Here the segmented image is multiplied with gray scale image so that we only get the number plate of the vehicle.

3.4. Feature Extraction- The purpose of feature extraction technique in image processing is to represent image in its compact and unique form of single values or matrix vector. Feature extraction technique is used to investigate the characteristics of narrow and broad weed by implementing the two dimensional discrete wavelet transform as the processing method. A wavelet is mathematical function used to divide a given function or continuous time signal into different scale components.

3.5. Classification- In character recognition characters are recognizing by applying a feature vector to the classifier. This is the main part of the system where actual recognition of character is done. In this approach we are using back propagation neural network. A general block diagram of back propagation neural network is as shown in fig.2.

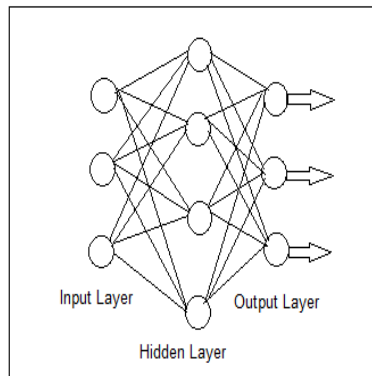


Fig.2. Back propagation Neural Network.

To perform some task, we must adjust the weights of each unit in such a way that error between the desired output and the actual output is reduced. It must calculate the error changes as each weight is increased or decreased slightly.

3.6. Character recognition- It is used for conversion of images of text into characters. Number plate recognition is now used to compare each individual character against the complete alphanumeric database using template matching. The matching process moves the template image to all possible positions in a larger source image. Matching is done on pixel by pixel basis. The template is as shown in fig. Since the template size is fixed, it leads to accurate recognition.

0	1	2	3	4	5	6	7	8
9	A	B	C	D	E	F	G	H
I	J	K	L	M	N	O	P	Q
R	S	T	U	V	W	X	Y	Z

IV.PERFORMANCE ANALYSIS AND RESULT ANALYSIS

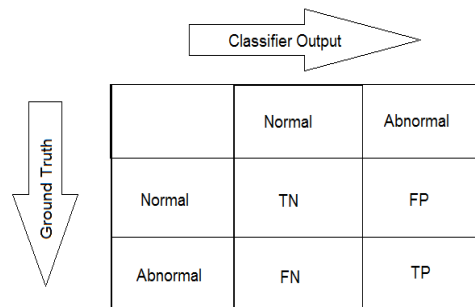
a. Performance Analysis

Accuracy is calculated using confusion matrix. The performance of a binary classifier can be assessed by tabulating its predictions on a test set with known labels in a confusion matrix. Here actual classes are in rows and predicted classes are in columns.

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A confusion matrix contains information about actual and predicted classifications done by a classification system. Performance of each system is evaluated using the data in the matrix. It is also called as contingency table.

b. Result Analysis

Fig (3) shows the result of preprocessing module.

Fig 3 (a) shows the input image of the system which is captured using webcam which is RGB image.

Fig.3 (b) shows the gray image conversion of input image shown in fig. (a).Figure 3(c) shows the binary image of image shown in figure 3(b).



Fig.3. (a) Input Image



Fig.3. (b) RGB to gray conversion



Fig.3. (c) Binary Image

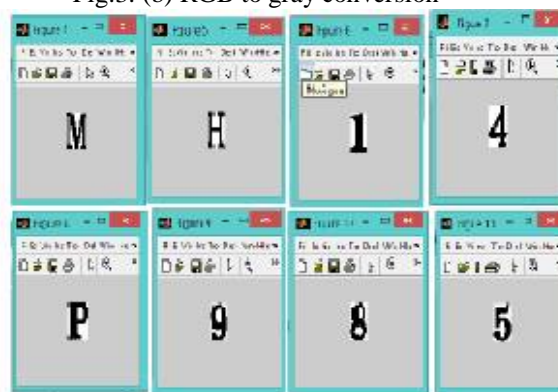


Figure (4) shows the segmented image.

The figure (5) shows the recognized number plate of image shown in figure 3 (a).



Fig.5. Recognized number plate



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V. CONCLUSION

In this system, in preprocessing stage median filter is used for removing the noise. We use boundary box technique for segmentation. Back propagation classifier gives high accuracy. The images of moving vehicle are captured with different distances and different lighting conditions. There are still certain drawbacks because of some parameters like speed of vehicle, script on number plate, quality of captured image, skew in the image. This can be removing by enhancing the algorithm further.

REFERENCES

1. Shen Zheng Wang & His-Jian Lee, "Detection and Recognition of License Plate Characters with Different Appearances", IEEE Intelligent Transportation Systems, Proceedings, vol. 2, PP 979-984, 2003.
2. Humayun Karim Sulehria, Ye Zhang, Danish Irfan, AtifKarimSulehria, "Vehicle Number Plate Recognition Using Mathematical Morphology and Neural Networks", WSEAS Transactions on Computers, Vol. 7, Issue 6, PP 781-790, June 2008.
3. Er.P.K.Suri,Dr. Ekta Walia, Er. AmitVerma," Vehicle Number Plate Detection using Sobel Edge Detection Technique, IJCST, Vol. 1, Issue 2, December 2010.
4. Christos Nikolaos E. Anagnostopoulos, Ionnis E. Anagnostopoulos,Ioannis D. Psoroulas, Vassili Loumos and Eleftherios Kayafas, "License Plate Recognition from Still Images and Vedio Sequences ", IEEE Transactions on Intelligent Transportation Systems, Vol. 9, No. 3, PP 377-391 September 2008.