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A ROBUST MORPHOLOGICAL OPERATION BASED AUTOMATIC LICENSE PLATE RECOGNITION

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ABSTRACT – In this thesis work focus on Automatic License Plate Recognition may be a challenging space of analysis because of its importance to a large style of its industrial applications. Three phases are used for license plate recognition. The initial phase is to capture the vehicle image victimization sensors like camera and extract the license plate image from the input image. The next phase is to section the registration code for extracting the characters from the image of the registration code that are supported options like color, shape, etc. The final phase is to find and acknowledge the segmental characters of the registration code. This proposed work focus on the High Security License Plate (HSLP) localization with the integrated segmentation approach. As the significance of open travel framework builds an Automatic License Plate Recognition has ended up being a critical exploration subject. ALPR furnished with numerous keen observation frameworks like, street activity administration, security administration, programmed toll gathering framework, and so on. Various systems have been offered for license plate recognition, every bearing its own particular points of interest and hindrances.

***Keywords*— High Security Number Plate (HSNP), Detection, Localization, Maximum Correlation and Recognition**

I. INTRODUCTION

License Plate Recognition (LPR) could be a combination of image process, character segmentation and recognition technologies accustomed establish vehicles by their license plates. Since solely the vehicle plate data is employed for identification, this technology needs no extra hardware to be put in on vehicles. LPR technology is consistently gaining quality, particularly in security and control systems. Vehicle plate Recognition Systems are used frequently for access management in buildings and parking areas, enforcement, purloined car detection, control, automatic toll assortment and research. There are several productive business systems available; but, there exists little documentation and public data regarding LPR system internals like the algorithms employed in plate localization and recognition.This technology is gaining quality in security and traffic installations. The technology conception assumes that everyone vehicles have already got the identity displayed (the plate!) therefore no extra transmitter or respondent is needed to be put in on the automobile.This information is utilized for social control, learning grouping, and (as inside the entrance framework highlighted above) will be acclimated open an entryway if the car is allowed or keep a period record on the section or exit for programmed for auto payment system.

Number Plate Recognition System discovers its utility in number of uses together with fringe crossing perception, toll administration, stopping administration, control and so on.

Owing to its vital application in such a big amount of fields, it has intrigued scientists since 1980's and has remained an active space of analysis ever since. Implementation of such an efficient security system will offer tangible ends up in criminal activities if not curb them.

A. Introduction to LPR Systems

Ongoing upgrades in innovation like infrared imaging and high determination cameras, and use of high intelligent foundations in tag producing have enhanced the exactness of LPR frameworks.

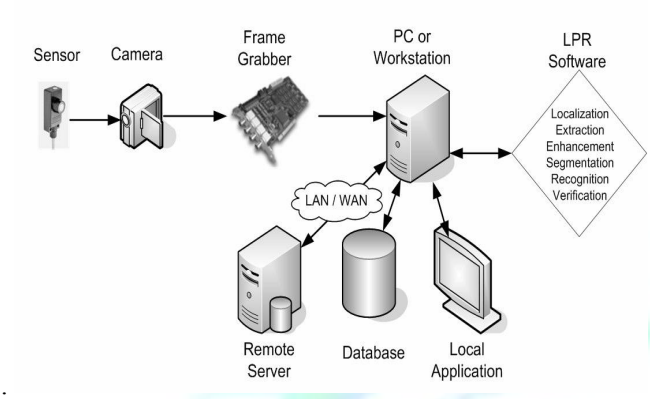


Fig. 1 A Typical LPR system

Sensors and other hardware peripherals are accustomed improve the image acquisition and remove irrelevant details. New video frame grabbers alter quick conversion of acquired images and new computers with correct LPR computer code render the system operable in period with high preciseness and accuracy. When the popularity method, the extracted data will be additional verified through native or remote database sand keep for future referencing. A typical LPR system consists of several hardware and computer code elements as illustrated in Fig.1.

B. Drawback Definition

Automatic recognition of license plates needs many image process and computer vision algorithms to be used at intervals one application. Text localization, extraction and sweetening, character segmentation and recognition operations are accustomed verify the range plate vehicle plate registration code} number in an exceedingly given image or video frame. Solely some of the previous studies involve all the steps of a typical LPR system, from image acquisition to verification. During this analysis, a complete license plate recognition system, that is predicated on constraints and operates in real-time, has been designed and enforced.

License plate localization and extraction are the foremost time overwhelming stages of atypical LPR system. Assumptions similarly as optimizations are needed in order for LPR systems to be ready to find license plates in real time. Previous studies used specific options like background color, plate border, size and symmetry, shape and texture. What is more, regular intervals between plate character and near-uniform background intensity and the sign transition of gradient also are used for plate localization. As more features are used in LPR systems, the accuracy of the localization increases. However, the procedure necessities increase in parallel. To minimize this side-effect, constraints and priori data are used. In the proposed system, a mixture of vertical edge options, sign transitions of gradient and near-uniform background intensity properties are used in accordance with government rules.

II. PROPOSED METHOD

The proposed method is design to detect the high security license plate detection by using maximum correlation based matching. The high security license plate detection is extravaganza task for traffic police and monitoring system. For the detection of license plate, first create the data base of the different numbers 0 to 9 and also collect the different character A to Z.

In the proposed work calculate the accuracy of detected deceases. For the calculation of accuracy required both data training and testing data sets. In the first part of proposed method create training data set and in the second part apply different image processing operations and number plate matching operation for licences plat detection. Father process shown in steps.

A. Training and Data set Creation

The above figure 2 shows the "How to create the Character Images and number data set train set creation".

Steps of Training Data Set creation

Step 1 – First collect the different type of character and number image which used in the different number plate or licence plate.

Step 2 – Create the date base for matching letter with the help of maximum correlation method.

The diagram of above steps also explained in the above figure 2.

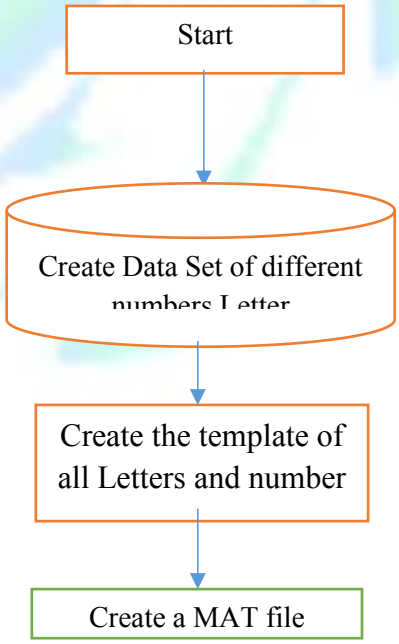


Fig. 2 Create Training Data Set for Character and number Matching

B. High Security Licence Plat Detection and Recognition

Step 1 – Query Image Selection:

First select the image from data set. The data set is the combination of the different types of licence plate images. There are different type of images in the data set. Data set contain different type of images like different character image and number image. For selecting the high security licence plate that is taken by traffic camera and stored in data base. For the pick or select licence plate capture image form data set using a matlab function that is uigetfile. Uigetfile is the predefined function in matlab for selecting dataset of the image. Also select the directory of image with the help cd command.

[file name, pathname, filte rindex] = uigetfile({'*.m;*.fig;*.mat;*.mdl', 'All MATLAB Files (*.m, *.fig, *.mat, *.mdl)';

Step 2 –Pre pressing of Input Licence Image:

After the select of image, apply this image into the pre-processing block. In this step perform the basic read and write operation of the image. Also perform the resizing of the image. As we already know all the morphological operation implement in the gray scale image. So also convert in the gray scale level.

If some little bit noise available in the image, for the removal of it apply the median filter on it. After the completing of pre-processing task of the image now apply the morphological operation on the images.

Start → Input image

[file , file path] = Uigetfile(input image) // Select the input image

I = imread('file') // Read the input file image

I=imresize(I,[400 NaN]); // Resize the image

I = rgbtogray(I); // Apply Gray Scale converter

I = medfilt2(I,[3 3]);// Apply Median Filter for Noise Removal

End →Preprocessing - I is the preprocessed image apply

All these commands are used in the preprocessing task of the image.

Step 3 – Apply Number and Character Extraction of Licence Plate

Morphological operators usually take a binary image and a structuring part as input and fusion them using a set operator (intersection, union, inclusion, complement). They phenomena objects within the input image supported characteristics of form, which are encoded within the structuring part.

For the extraction of numbers and letters from the licence plate apply morphological operations. They are shown in below with the help of these morphological operation obtain the number and letter from the licence plate. Used morphological operations are shown in below.

Start→ Pre-processed Image

I = imsubtract(si,se); // eliminate the extra Part of the LP

I = mat2gray(I); // Convert into MAT file

I = conv2(I,[1 1;1 1]);

I = imadjust(I,[0.5 0.7],[0 1],0.1); // Adjust the contrast level

I = logical(I); // Convert gray image into logical image

er = imerode(I,strel('line',50,0)); // Apply Extraction of targeted part

I = imsubtract(I,er); // Apply Subtraction of the image

I = imfill(I,'holes'); // Apply the filling of holes

I = bwareaopen(I,100); // Apply Reason Propose to extract the number form LP

End→ Extraction of number and charter

Step 4 – Apply the matching of the extracted output with the help of maximum correction function for the matching of recognized letter. Now finding the 2-D correlation coefficient between the images in the template and the input image,

```
for n=1:length(NewTemplates)
sem=corr2(NewTemplates{1,n},snap);//Convolution
//finding the 2-D correlation coefficient between the images in the template and the input
comp=[comp sem];
end
vd=find(comp==max(comp)); // finding the object with maximum correlation
if vd==1 || vd==2
letter='A';
elseif vd==3 || vd==4
letter='B';
elseif vd==5
letter='C';
elseif vd==6 || vd==7
letter='D';
elseif vd==8
letter='F';
elseif vd==10
letter='G';
elseif vd==11
letter='H';
elseif vd==46 || vd==47 || vd==48
letter='9';
else
letter='0';
end
end
```

Apply the above condition in all the images. In between all charters and numbers A to Z and 0 to 9.

Step 5 – Calculate the performance parameters of proposed method. Calculate the accuracy of proposed method with the help of supervised learning method.

III. SIMULATION AND RESULT

The result of proposed method for the detection and reorganization of high security licence plate in traffic images processing shown in this section. For the implementation of proposed method using MATLAB result calculation. We

have done proposed work with the help the MATLAB R2013b software and simulate our whole proposed methodology in graphical user interface (GUI). The performance of the proposed algorithm is tested for different licence plate that is shown in below figure 5.1. Basic configuration of our system is: Processor: Intel (R) Quad Core (VM) i5–3110 Central Processing unit @, 2.40 GHz with 4GB RAM: System type: 64-bit Operating System. MATLAB based simulation result shows better detection of high security licence plat detection as compare of different methods.

A. Result Parameters –It There are different result parameters in licence plat detection in traffic system like accuracy of the result, in this proposed work on different licence plate's detections. Therefor correct number plate detection and reorganization is the important parameter of the proposed work.

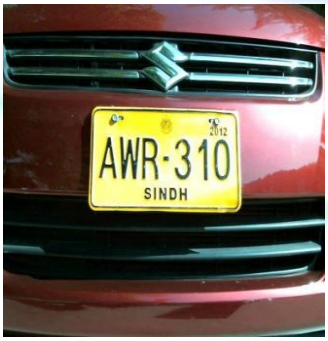
Accuracy - In the number plate detection task, a detected as a decease is a true positive (TP) whereas a real negative (TN) is a non-effected leaf of plant detected. The false negatives (FN), on the other hand, are effected parts of leaf. In some industrial applications, such as correct number detection, and the overall accuracy of the detection system, the FN is also an important factor. Any system with higher precision but a considerable number of FN may mean a higher risk because if the weed or diseased plants are left out they can quickly spread or multiply, jeopardizing net production even after Application of a specific treatment:

$$\text{Accuracy} = (TP + TN) / S \quad (1)$$

When S is the total number of samples in the test set, FP is the number of false positives (license plate detected as plant) and FNR is the false negative rate.

B.Data Sets – There are different licence plate data set are taken for performing proposed work

(a)



(b)

(c)

(d)

(e)

(f)

(g)

Fig. 3 – Shows the different Licences Plate

In the above data set there are different images are shown. These images are capture by using different location of image. In all the images are clearly shown that colour images and different colours. The number plates are high security number plates.

C.Steps of Proposed Method

In the figure 4.three figures are shown, in the back end of this GUI three axis windows.

First window or Axis Shows the test image in which apply proposed method. For this first we select the input image by

press push button "LOAD IMAGE". After this open a new window for pick this image.

Fig. 4: Shows the 1st step Selection of the input image

D. Back End of proposed GUI – In the below figure shows the back end of the GUI of proposed method. The proposed method is divide into the two section. 1. Section is shows the deceases detection parts and 2 section calculate the result parameters. In below figure 5.

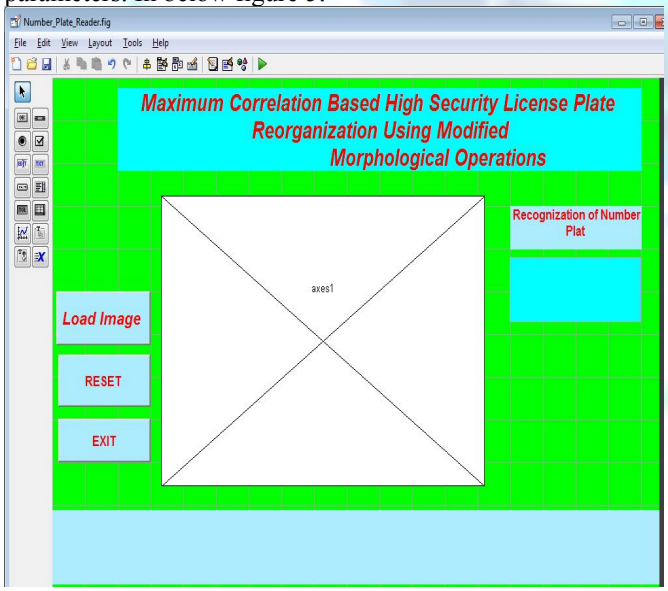


Fig. 5 Shows the Back end of the GUI

Section -1

In the above figure 5 shows the three axis – Axis 1, three push button push buton1 – For loaf image, push button 2 – For Reset, push button 3 for Exit to close the GUI. Last push button is Exit to close the graphical user interface.

Table 1 Result Comparison

Methods	Image Data Base	Total Image	Detection	Segmentation	Accuracy (%)
Base Method Haris Corner Based [2016]	Good Image	35	35	34	93.84 %
	Challenged Image	30	28	37	
Proposed Method	Different Image	70	68	79	94.56 %

E.Result of Different Licence Plate Image

Fig. 6 Shows the Output of the Proposed Method

Fig. 7 Shows the output of Proposed Method

IV. CONCLUTION

In this presented work, presented a HSLP detection in cars and heavy vehicle like performing proposed work. For the detection using modified morphological operation. We have shown that HSLP can be detected with an awfully high accuracy, up to 98% in the different test images. The validation tests showed that HSNP deceases plants so avoiding sensing. Colour number plate detection with maximum convolution is highly enthusiastic about the quality of the colour perception that demands use of cameras with fine-tuned and label colour filters. Environmental factors, such as sunlight, still pose the biggest challenge for different HSLP detection. Presented work additionally detect the different type of HSLP detection of different vehicle.

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