

MATLAB Based OCR Toolbox Designing for Decoding of Vehicle Number Plate

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Abstract: This paper is for designing a MATLAB Code for optical character recognition (OCR) toolbox which converts the image in to text. On this project our project is used for decoding of vehicle number plate to access the registration information. In the present scenario society is based upon the automation and digitalization. To save the time and manual approach in detecting and decoding of Vehicle number plate our project will helpful. OCR is a MATLAB code which converts the vehicle number plate characters into the text. The decoded information will helpful and time saving process for police in case of thefts and traffic violation.

Keywords: xlsread, xlswrite, Template, OCR, Structural elements, DVN algorithm.

1. Introduction

Our algorithm is an Digital Image processing Technique of extraction of vehicle information by their number plates. DVN algorithm (Detection of Vehicle Number plate) is used for the purpose of extracting of violated and wanted vehicles. Detection of Vehicle Number plate (DVN) is simple procedure for getting owner information such as address for Vehicle identification [1].

Optical character recognition or optical character reader (OCR) is the electronic or mechanical conversion of images of typed, handwritten or printed text into machine-encoded text, whether from a scanned document, a photo of a document, a scene-photo (for example the text on signs and billboards in a landscape photo) or from subtitle text superimposed on an image (for example from a television broadcast).



Fig. 1. Vehicle number plate

With the increasing number of vehicle in present world it's not possible to manually keep a record of the entire vehicle. There need to be a police standing 24 hours note down the number. It's a time overwhelming procedure and involve heavy manpower. The accuracy is decreases with increasing the time in the manual approach. So to overcome all these borders here we implemented a system which would automatically convert

the vehicle number plate image into text and retrieve the information of vehicle from its database.

2. Procedure

Our Propose algorithm contains four parts

1. Designing of Optical Character Reader tool box
2. Checking of number plate type.
3. Steps in DVN Algorithm
4. Searching algorithm for getting the vehicle registration details.

A. Designing of optical character reader tool box

1) Template Creation

In this is step we saved images of alphanumeric (26 alphabets and 10 numbers) in a folder and call them in designing OCR tool box [2]. These images are stored in MATLAB memory.

2) Reading of Templates

```

Editor - F:\circuit digest\Number Plate Detection\template_creation.m
Plate_detection.m Letter_detection.m template_creation.m +
1 %CREATE TEMPLATES
2 %Alphabets
3 A=imread('alpha/A.bmp');B=imread('alpha/B.bmp');C=imread('alpha/C.bmp');
4 D=imread('alpha/D.bmp');E=imread('alpha/E.bmp');F=imread('alpha/F.bmp');
5 G=imread('alpha/G.bmp');H=imread('alpha/H.bmp');I=imread('alpha/I.bmp');
6 J=imread('alpha/J.bmp');K=imread('alpha/K.bmp');L=imread('alpha/L.bmp');
7 M=imread('alpha/M.bmp');N=imread('alpha/N.bmp');O=imread('alpha/O.bmp');
8 P=imread('alpha/P.bmp');Q=imread('alpha/Q.bmp');R=imread('alpha/R.bmp');
9 S=imread('alpha/S.bmp');T=imread('alpha/T.bmp');U=imread('alpha/U.bmp');
10 V=imread('alpha/V.bmp');W=imread('alpha/W.bmp');X=imread('alpha/X.bmp');
11 Y=imread('alpha/Y.bmp');Z=imread('alpha/Z.bmp');
12
13 %Natural Numbers
14 one=imread('alpha/1.bmp');two=imread('alpha/2.bmp');
15 three=imread('alpha/3.bmp');four=imread('alpha/4.bmp');
16 five=imread('alpha/5.bmp');six=imread('alpha/6.bmp');
17 seven=imread('alpha/7.bmp');eight=imread('alpha/8.bmp');
18 nine=imread('alpha/9.bmp');zero=imread('alpha/0.bmp');
19
    
```

Fig. 2. Reading templates

Here, in the above code we are saving the images into a variable by using command 'imread()'. This function is used to call the images from the folder or from any location of the PC into the MATLAB.

3) Letter detection

Here the database image is correlated with the segmented image (input image) with the syntax 'result =corr2(input

image, template image)'.
 If the result > 0.9 then the resultant text will have displayed.

```

1 function letter=readLetter (snap)
2
3 load NewTemplates
4 snap=imresize (snap, [42 24]);
5 rec= [];
6
7 for n=1:length(NewTemplates)
8 cor=corr2 (NewTemplates(1,n), snap);
9 rec=[rec cor];
10 end
11
12 ind=find (rec==max (rec));
13 display (ind);
14
15 % Alphabets listings.
16 if ind==1 || ind==2
17 letter='A';
18 elseif ind==3 || ind==4
19 letter='B';
20 elseif ind==5
21 letter='C';
22 elseif ind==6 || ind==7
23 letter='D';
24 elseif ind==8
25 letter='E';
26
    
```

Fig. 3. Letter detection

4) *Checking of number plate type*

There are two types of number plates in INDIA. We classified as Single layered number plate and double layered number plate. Before applying the algorithm first know about the number plate type. The decision was taken by aspect ratio. If the aspect ratio is greater than 0.45 it is double layered number plate. If the aspect ratio is less than 0.45 it is single layered number plate.

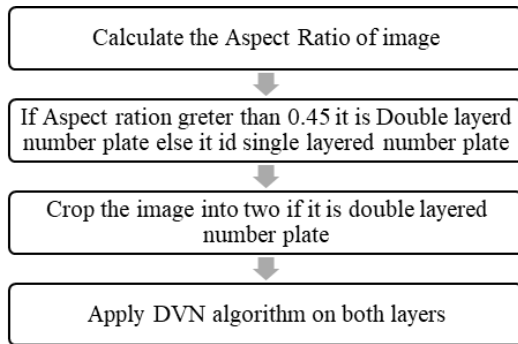


Fig. 4. Checking of no. of layers' flow chart

5) *Steps in DVN Algorithm*

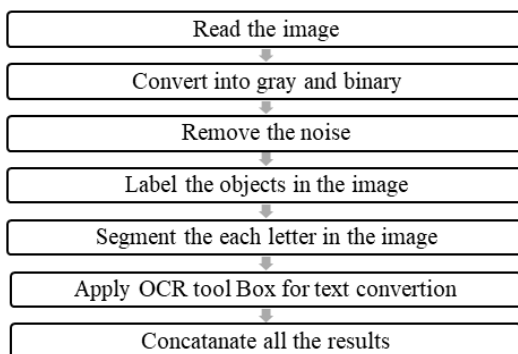


Fig. 5. DVN algorithm

DVN algorithm means detection of vehicle number Algorithm. In this procedure we will effort on the image taken as the input from the camera which is in RGB format. We will be transforming that image into gray scale image.

Now the image is converted into logical image. Then noise is eliminated using the structural elements. Now each letter in the image is laded with different labels. Now each letter is cropped. Now OCR is applied on the each cropped image and converted as text.

6) *Searching algorithm for getting the vehicle registration details*

Microsoft Excel is used to store the user information. VLOOKUP is the default key word in Microsoft Excel. A VLOOKUP is an Excel-function that looks for something in a range of cells. Then it returns that something that's in the same row as the value you're looking for. To help you better understand the power of VLOOKUP, we've created a free exercise file.

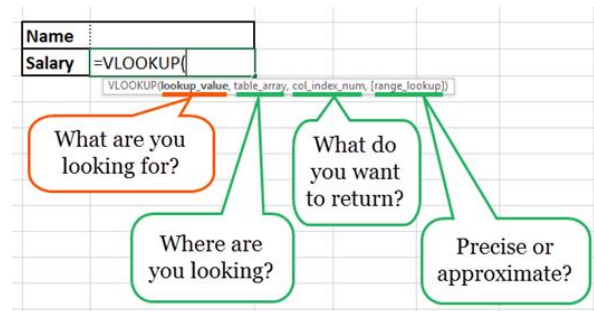


Fig. 6. VLOOKUP

It's a sample file with a list of employees that makes following this tutorial super easy.

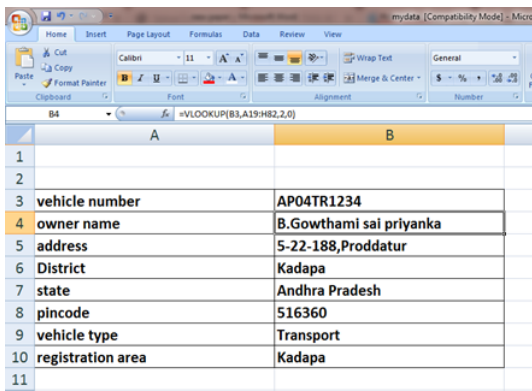
With this data in hand, we're going to create a tool that searches this list of employees. Then the tool returns the specific data we're looking for – all powered by VLOOKUP. The only caveat is, that the datasheet has to be listed vertically (which is the case 99% of the time).

When conducting a VLOOKUP in Excel, you're essentially looking for new data in a different spreadsheet that is associated with old data in your current one. When VLOOKUP runs this search, it always looks for the new data to the right of your current data. For instance, if one spreadsheet has a vertical list of names, and another spreadsheet has an unorganized list of those names and their email addresses, you can use VLOOKUP to retrieve those email addresses in the order you have them in your first spreadsheet. Those emails addresses must be listed in the column to the right of the names in the second spreadsheet, or Excel won't be able to find them. There are four pieces of information that you will need in order to build the VLOOKUP syntax:

Example:
 =VLOOKUP (value, table, index_number, [approximate_match])

=VLOOKUP(B3,A19:H82,2,0)

Now the VLOOKUP function performs a vertical lookup by searching and display the required fields such as owner information, Address, District, State, PINCODE and vehicle type.



	A	B
1		
2		
3	vehicle number	AP04TR1234
4	owner name	B.Gowthami sai priyanka
5	address	5-22-188,Proddatur
6	District	Kadapa
7	state	Andhra Pradesh
8	pincode	516360
9	vehicle type	Transport
10	registration area	Kadapa
11		

Fig. 7. Extracting Information using VLOOKUP

The result of DVN algorithm is transferred to excel sheet then VLOOKUP search the data and now it is transferred to MATLAB using the syntax

`[aa,bb,cc]=xlsread('mydata.xls');`

The above command returns the text fields in cell array aa, returns the numeric data in bb and both numeric and text data in cell array cc, using any of the input arguments in the previous syntaxes.

3. Output

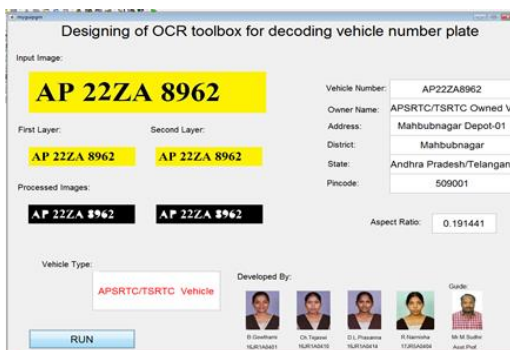


Fig. 8. Result

We checked 50 number plates only 1 number plates we got error. The accuracy percentage is 98%. The character reorganization percentage is 99.6%. We got those two errors in detecting 0 (zero) and O (Alphabet O).

4. Conclusion

In this, a software is designed which decode the vehicle number plate number using MATLAB. The proposed method is mainly designed for decoding of Indian vehicle number. This

method has four main stages. This method has been tested over a large number of images which proved the efficiency and accuracy of the method. It has been observed that the proposed model exhibits 98% accuracy rate for our tested dataset.

References

- [1] Bhawna Tiwari, Archana Sharma, Malti Gautam Singh, Bhawana Rathi Automatic Vehicle Number Plate Recognition System using Matlab IOSR Journal of Electronics and Communication Engineering (IOSR-JECE).
- [2] Tejas K, Ashok Reddy K, Pradeep Reddy D, Rajesh Kumar M Efficient Licence Plate Detection by Unique Edge Detection Algorithm and Smarter Interpretation Through IoT
- [3] Xiaoqing Liu and Jagath Samarabandu, Multiscale Edge-Based text extraction from complex images, Multimedia and Expo, 2006 IEEE International Conference, 2006.
- [4] Maduguri Sudhir, Cenikala Baswanth Vignesh, Chinthala Cheruvu Jairam, Dasari Anitha and Tunuguntla Sreeja, "Image Based Vehicle Number Plate Decoding," International Journal of Research in Advent Technology, Vol. 5, No. 1, January 2017.