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MATLAB Based Vehicle Number Plate Recognition

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Abstract:** **The ANPR (Automatic Number plate Recognition) system is based on image processing technology. It is one of the necessary systems designed to detect the vehicle number plate. In today's world with the increasing number of vehicle day by day it's not possible to manually keep a record of the entire vehicle. With the development of this system it becomes easy to keep a record and use it whenever required. The main objective here is to design an efficient automatic vehicle identification system by using vehicle number plate. The system first would capture the vehicles image as soon as the vehicle reaches the security checking area. The captured images are then extracted by using the segmentation process. Optical character recognition is used to identify the characters. The obtained data is then compared with the data stored in their database. The system is implemented and simulated on MATLAB and performance is tested on real images. This type of system is widely used in Traffic control areas, tolling, parking area.etc. This system is mainly designed for the purpose of security system.

Keywords:** **Number Plate Recognition, Gray Processing, Image Acquisition, Image Binarization, Template Matching.
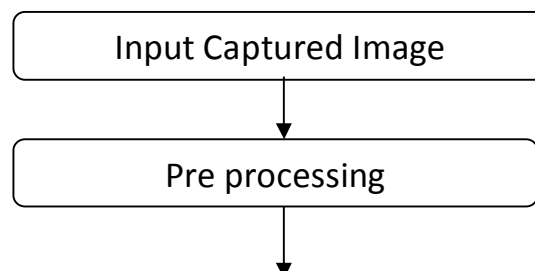
I.   INTRODUCTION

With the increasing number of vehicle in today's world it's not possible to manually keep a record of the entire vehicle. There need to be a man standing 24*7 to note down the number. It's a time consuming process and require manpower. Furthermore the data stored manually is not readable after a long time. So to overcome all these limitations here we tried to develop a system which would automatically detect the number plate and store it in its database. Later on when the information is required one can get it and use it. This process also helps to get the correct result compared to manually one. The process of working involves that as soon as the vehicle enters the secured area the system automatically captures the images and stores it. The processing of the image is done through the software stored in the system. If the vehicle matches the already stored information then it's allowed to pass the gate. And if the vehicle is not recognized or if its marked in the blocked list then it's not allowed to cross the gate and further checking process are followed.

II.   METHODOLOGY

The working of full NPR system can be divided in to two broad sections. The hardware part and the software part. The working mechanism of all the parts is described in details below.

A.   Software Model

The first and the most important part in this process is the software model. The software model uses the image processing technology. The programs are implemented in MATLAB. The algorithm is divided into following parts: Capture image, Pre-processing, Plate region extraction, Segmentation of character in the   extracted number plate, Character recognition, Comparison with database and Indicate result. The flow chart of license plate recognition system implementation in this work is shown in the following figure. There are various steps in this approach and these are implementation in MATLAB.

```
┌──────────────────────────────┐
│    Input Captured Image       │
└──────────────────────────────┘
               │
               ▼
┌──────────────────────────────┐
│      Pre processing           │
└──────────────────────────────┘
               │
               ▼
```

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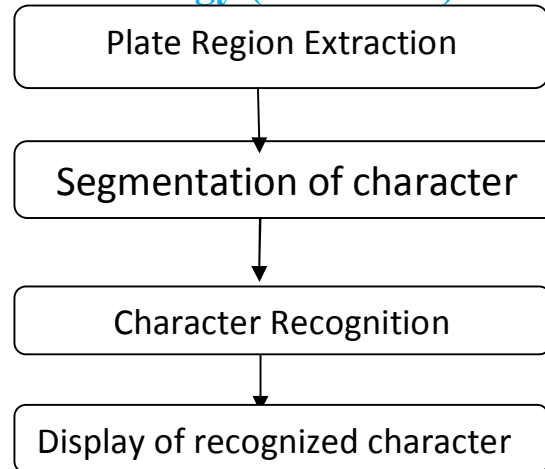

Figure 1: Flow Diagram of ANPR

III.   WORK FLOW PROCESS

A.   Capture of Image

The first step is the capture of image. The image is captured by electronic device. Digital Camera or Webcam. The image captured is stored in JPEG format. Later on it is converted in to gray scale image in MATLAB.

B.   Pre-processing

The next step after capturing the image is the pre processing of the image. When the image is captured there is lot of disturbances and noises present in the image for which the image can't be used properly. So in this step the noises from the image are required to be cleared to obtain an accurate result.

1)   Gray Processing: this step involves the conversion of image in to Gray levels. Color images are converted in to Gray image. According to the R, G, B value in the image, it calculates the value of gray value, and obtains the gray image at the same time.

2)   Median Filtering: media filtering is the step to remove the noises from the image. Gray level cannot remove the noises. So to make image free from noise media filtering is used.

C.   Plate region extraction

The most important stage is the extraction of number plate from eroded image significantly. The extraction can be done by using image segmentation method. There are numerous image segmentation methods available in various literatures. In most of the methods image binarization is used.

D.   Character segmentation

In this step get the o/p of extracted number plate using labeling components, and then separate each character and split the each and every character in the number plate image by using split and also find the length of the number plate, then find the correlation and database if both the value is same means it will generate the value 0-9 and A - Z, and finally convert the value to string and display it in edit box, and also store the character in some text file in this code. Following figure shows the segmented characters.

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DATABASE CREATION

IV.   IMPLEMENTATIONS

The character recognition is now used to compare the each individual character with he character stored in the database. OCR uses the correlation method to match the characters. And if both the character matches then it displays the authorized otherwise it will display the unauthorized.

A. Hardware Model

The hardware model consists microcontroller for controlling the complete hardware of the ANPR system. The ANPR algorithm on a PC receives the image and performs the processing, which Yields the vehicle number. This Number is then compared to standard database and finally provides signal to microcontroller to control the system Hardware. If the inputted plate contains the authorized number then the green indication light will be switched on w, and if the inputted plate contains an unauthorized number then red indication will be switched-on. The complete hardware model is shown in figure below.

V.   EXPERIMENTAL RESULTS

This section presents the simulation results of the developed ANPR system. Different images of cars having different colours and structure types are taken and stored in PC. The screenshot of the simulation and are displays below. Two original images of vehicle are shown.

ANPR USING MATLAB

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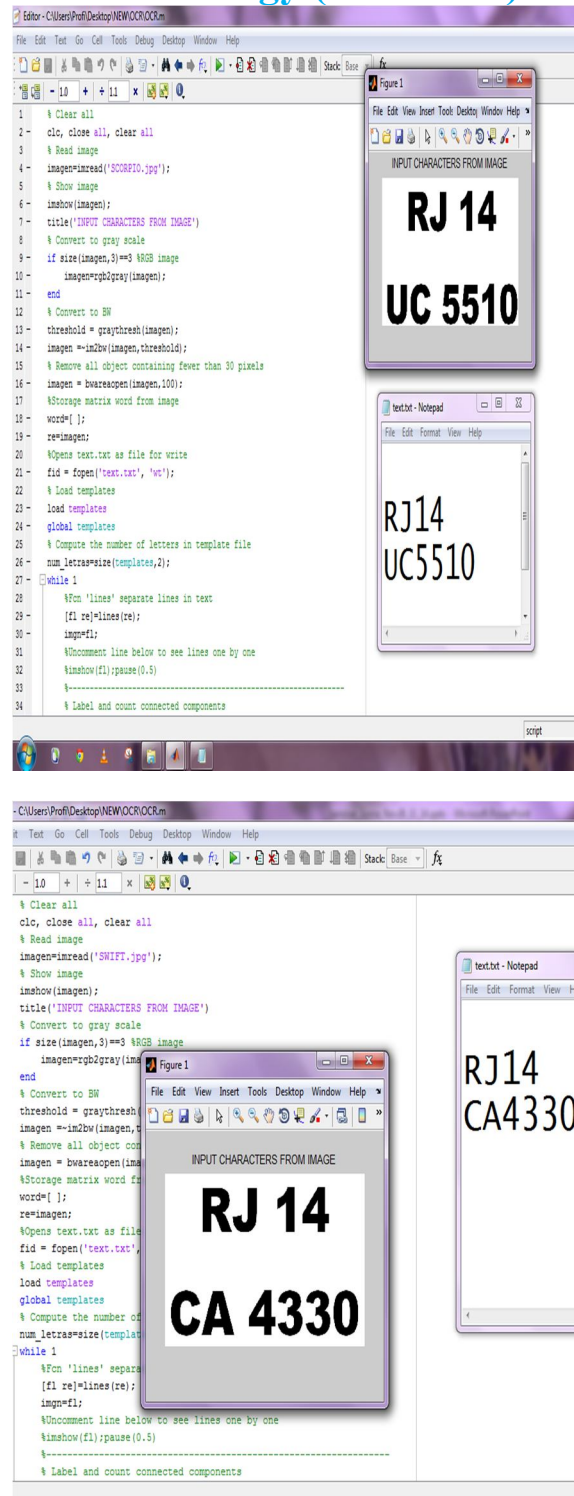
VI.   CONCLUSION

We have implemented number plate recognition. Our algorithm successfully detects the number plate region from the image which consists of vehicle number & then character segmentation, recognition .We have applied our algorithm on many images and found that it successfully recognition. The project was designed keeping in mind the automation of the number plate detection system for security reason that could replace the current system of manual entry. This project was a success in recording the number plate of a

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vehicle although it has got its own limitation of image processing and other hardware requirements.

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