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An Automatic Control of Vehicle Entry in Forest Area using ANPR System

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Abstract:- In this paper we Design a completely automated monitoring and control of vehicle entry-exit in restricted area using ANPR system. Automatic Number Plate Recognition system i.e. ANPR system is an image processing technology. The project aims at designing a system which captures vehicle image along with its number plate automatically and further these details are verified with the database filled in online registration form . The system has color image inputs of a vehicle and the output has the registration number of that vehicle. The system first senses the vehicle and then gets an image of vehicle from the front view of the vehicle. Vehicle number plate region is extracted using the image segmentation in an image. Optical character recognition technique is used for the character recognition. The resulting data is then used to compare with the records on a database so as to come up with the specific information like the vehicle's owner, vehicle number, address, etc. If the Vehicle number is match then the gate will be open with the help of DC motor. The system is implemented and simulated in Matlab, and it performance is tested on real image.

Keywords:- Number plate recognition, Indian number plates, webpage, web camera, dc motor driver, LED, buzzer.

I. INTRODUCTION

In a restricted area like forest the entry will be conform after getting permission from the special authority. In design of this project we make an authorized online registration form. This page store the data require for the point of security under authority of forest. ANPR can be used to store the images captured by the cameras and the text from the license plate. These recognition Systems commonly use the camera to take the picture at time of the day. ANPR technology tends to be region-specific, want to plate variation from anywhere. Concerns about these systems have centered on privacy fears of government tracking movements, misidentification, high error rates, and increased government spending issue. The registration page on which user fill their information data as per the page contain .The registration form consist of username, mobile number, vehicle number and his full address.

The paper want to design a system in which camera captures the image of the number plate automatically of a vehicle and these details were verified using Arduino for authentication. With the help of MATLAB Software the number plate is to be recognized and verified with the registered data. The authorities be alert by this system when any unauthorized image of number plate is detected using buzzer. After this verification process the gate is to be open for the legal entry. If data is to be match then with stepper motor gate is to be open to inter. In India, basically, there are two types of number plates, black characters in white plate and black characters in yellow plate. The former for indivisual vehicles and latter for public service vehicles.

ANPR algorithms are generally divided in 5 steps

- Capture.
- Preprocess.
- Licence Plate Extractor.
- Character Segmentation.
- Optical Character Recognition.

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The camera may be adjusted with respect to the number plates. Filtering is the set of algorithms applied on the image for better quality. For the present system filtering consists 2 processes: Resize – The picture size from the camera may be large and can make the system stumpy. It is to be resized to a probable aspect ratio. Convert Color Space – Pictures captured using cameras will be either in untreated format or prearranged into some multimedia standards. Normally, these images will be in RGB mode, with three components (viz. red, green and blue).if our projected system has to distinguish number plates, then the binary representation is formed from the image. In character segmentation image processing is done on extracted number plate to eliminate redundant data. After character segmentation, the extracted number plate has only those characters that fit in number plate. This also accomplished with the size elevation ratios identical with the contours detected on extracted number plate. Finally, the chosen bloks are send to an Optical Character Recognition (OCR) Engine, which proceeds the ASCII of the number plate. Accurateness of Character Recognition depends on how Number Plate Detection and Character Segmentation are locating vehicle number plate and divide each character. The presented ANPR system is aimed to be light weighted so that it can be run real time and recognizes standard number plate under normal conditions.

II. PROPOSED METHOD OF ANPR

First of all, Image frame is captured by a high resolution camera from the distance of 4 to 5 meters from the vehicle. Then the presented system locates the object area by employing canny edge detector and morphological operation. The flowchart of the proposed Algorithm is given in Fig.1

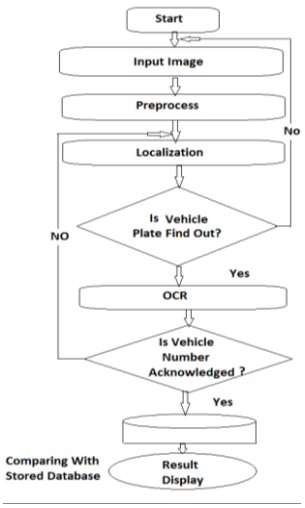

Fig. 1:- Algorithm Design of ANPR

A. *Image Acquirement and Preprocessing*

The ANPR system requires a high resolution camera to acquire an image. it is captured at different distance from the vehicle. Then the image frames are resized to a predefined (400 X 600) size and all the processing steps are executed on gray scale image as shown in Figure 3. The purpose of this is to enhance the processing speed, increase the contrast of image and existing noise. The image frames are filtered to eliminate the noise after resizing and converting to gray scale image.

Fig. 2:- Captured Image

Fig. 3:- Gray Scale Image

B. *Identifying the Edge*

The image frames are then processed by using some competent algorithms in order to recognize the object. The plate area edge is identified by using 'Canny detector'. Then the image is converted into binary image as shown in Figure 4. For sorting out all the rear noise and conserve the number plate area in the image frames are passed through the median filter

Fig. 4:- Filtered Image

Canny detection algorithm is performed through following five steps:

- Smoothing: Eliminate the noise by staining.
- Locating gradients: The large gradients of the image are calculated and marked to identify edges.
- Non-maximum containment: Only local maxima are calculated to be the edges.
- Double threshold: Powerful edges are ascertained by fixing the threshold at 0.5.
- Edge approaching by hysteresis: The end point of edges are determined by deleting all edges. those are not connected to a very true edge, as shown in Figure 5. In the image, all the actual edges are calculated even some of the edges in the surrounding, like edges or margin of tree or railing are also marked and getting an edge image as shown in Figure.5

Fig. 5:- Detecting Edges Using Canny Detector

C. Candidate Vehicle Plate Area Identification

Morphological Operation is applied for removing the irrelevant objects in the image. Dilation and erosion are performed in order to extract desired plate areas from the processed image.

D. Vehicle Plate Character Segmentation

It is must to recognize the vehicle number accurately, which is mostly dependent on the character separation or isolation. So all the character from the image are separated without losing any element of a character. The segmentation step in ANPR system consider the analysis of character pattern, region and adjoin element.

E .Vehicle Plate Character Area Enhancement

For enhancing the number plate character area, proper segmentation is needed. Appropriate segmentation is done by selecting correct threshold values. Thresholding effect is shown in Figure 6.

Fig. 6:- Noise Enhancing Characte

F. Attached Component Study

Connected component analysis algorithm is used to remove the noise from the object (characters on the plate). Each labeled matrix of 8-connectivity pixels is evaluated based on the area. Attached element or component study is used to eliminate the noise. 8-connected pixels is appraise based on the places of every labeled matrix. One of the resulting images is shown in Figure 7.

Fig. 7:- Connected Element Study

G. Vertical Position Study

Character segment is used to separate the character from number plate. Vertical blank area between two consecutive alpha-numeric characters in the image is considered the separation line. After separation, each row and column data are stored. This module separates each and every alphabet and number on the vehicle number plate designed on horizontally decorated in one row.

Fig. 8:- Vertical Position With Respective Segmented Characters

H. Vehicle Plate Number Recognition

In ANPR system it is the most significant and critical stage to generate proper output. The previous steps are responsible for detecting the pattern of characters from captured image. The segmented number plate characters are rescaled to resemble the characters within a window. Each vehicle number plate character is converted to binary image with proper size and standard dimension before additional processing steps are applied. In this technique characters are identified by comparing the similarity of object or character element. In order to compare the alphanumeric characters with the database.

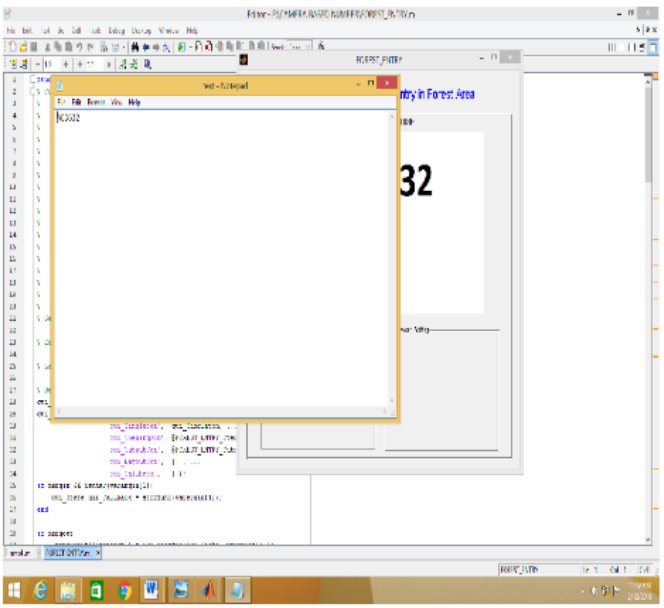

Fig. 9:- Output of character recognition

III. LITERATURE SURVEY

Ronak P Patel proposed new algorithm for recognition number plate using Morphological operation and bounding box analysis for number plate extraction. Najeem

Owamoyo proposed method for number plate extraction using Sobel filter and morphological operations. Divya Gilly presented an efficient method for license plate detection by connected component analysis. Isack Bulugu has proposed edge finding method to find the location of the plate. Rupali Kate proposed algorithm based on a combination of morphological operation with area criteria tests for number plate localization. Hadi Sharifi has study and evaluates some most important license plate detection algorithms and compared them in terms of accuracy, performance, complexity, and their usefulness in different environmental condition. This evaluation gives views to the developers or end-users to choose the most appropriate technique for their applications. The study and investigation show that the dynamic programming algorithm is the fastest and the Gabor transform is the most accuracy algorithm compared to other algorithms. Kumar Parasuraman and P.Vasantha Kumar proposed algorithm for extracting the Plate region using edge detection algorithm and vertical projection method. This paper presents a simple method for the extraction of number plate from the vehicle image based on morphological operations, thresholding and sobel edge detection and the connected component analysis.

Muhammad tahir qadri, proposed Automatic number plate recognition system for vehicle identification using optical character recognition, ANPR is an image processing technology which uses number plate to identify the vehicle. The objective is to design an efficient automatic authorized vehicle identification system first detects the vehicle and captures the vehicle image. Vehicles number plate region is extracted using the image segmentation in an image. Optical character recognition technique is used for the character recognition. The resulting data is then used to compare with the records on a database so as to come up with the specific information like the vehicles owner, place of registration, address etc.

Ayatullah faruk Mollah, proposed Design of an optical character recognition system for camera based handheld devices, a complete Optical character recognition (OCR) system for camera images embedded textual documents for handled devices. At first, text regions and extracted and skew corrected. Then, these regions are binaries and segmented into lines and characters. Characters are passed into the recognition module. Vadini Sharma, Prakash C. Mathpal, proposed Automatic license plate recognition using optical character recognition and template matching on all colour license plate, Automatic license plate recognition is used to recognize the characters from license plate image. It is widely used in various areas such as traffic control, robbery and surveillance. The proposed method applied on all colour license plate. It has two main stages. Firstly, exact location of the license plate is detected from an input image by using image acquisition and optical character recognition and secondly, template matching is used to test the recognized character with templates.

Christos-Nikolaos E. Anagnostopoulos presented various methods used for number plate extraction. Shan Du presented a survey on existing ANPR methods and categorizing them according to the features used in each stage and compares them in terms pros, cons, accuracy, and processing speed. Sahil Shaikh proposed method for number plate recognition. For plate localization, several traditional images processing techniques such as image enhancement, edge detection, filtering and component analysis are used. Norizam Sulaiman presented the development of automatic vehicle plate detection system in which after pre-processing the candidate plate is detected by means of feature extraction method, character segmentation is done by boundary box and character recognition is done by template matching.

Reza Azad proposed a fast and real time method in which has an appropriate application to find tilt and poor quality plates. In the proposed method, the image is converted into binary mode using adaptive threshold. Ronak P Patel proposed new algorithm for recognition number plate using Thresholding operation, Morphological operation, Edge detection, boundary box analysis for number plate extraction. Najeem Owamoyo proposed Automatic Number recognition for Nigerian vehicles. Number plate extraction is done using Sobel edge detection filter, morphological operations and connected component analysis. Character segmentation is done by connected component and vertical projection analysis. Sourav Roy proposed algorithm for localization of number plate for the vehicles in West Bengal (India) and segmented the numbers as to identify each number separately. This approach is based on morphological operation and sobel edge detection. After reducing noise from the input image the enhancement of image is done using histogram equalization.

Divya Gilly proposed an efficient method for LPR. LPR system mainly consists of three main phases 1) plate detection 2) character segmentation 3) character recognition. This method utilizes a template matching technique for character recognition. This method is suitable for both Indian number plates and foreign license plates. Isack Bulugu has proposed an algorithm that is designed to recognize the license plate from the front end and rear end of the vehicle. The implementation of the program is developed on MATLAB Rupali Kate has proposed an algorithm based on morphological operation with number of area criteria tests for number plate localization. Character segmentation was achieved region props toolbox function in MATLAB and character recognition was done by the Template matching. P.Mohan Kumar proposed method for real time vehicle license plate identification. Hadi Sharifi presented the study and evaluation of some important license plate detection algorithms and compared them in terms of performance, accuracy, complexity, and their usefulness in different environmental condition. The dynamic programming algorithm is the fastest and the Gabor transform is the most accuracy algorithm compared to other license plate detection algorithms.

Kumar Parasuraman has proposed an algorithm consist of 3 parts. Edge detection algorithm and vertical projection method are used for extracting the Plate region. In segmentation part, filtering and vertical and horizontal projection are used. Chain code concept is used for character recognition. S. Hamidreza Kasaei presented a real time and

robust method of license plate detection based on the morphology and template matching. This paper presents an efficient approach for the extraction of number plate from the vehicle image based on morphological operations (opening, closing, dilation, and erosion), image subtraction, thresholding, sobel edge detection and the connected component analysis. Firstly the input image is preprocessed by iterative bilateral filter and adaptive histogram equalization.

IV. CONCLUSION

In this paper, the automatic vehicle identification system using vehicle number plate is presented. The system use image processing techniques for identifying the vehicle from the database stored in the PC. The system is implemented in Matlab and it performance is tested on real images. Using online registration form it increases chances of conformation of visiting any restricted authorized location, it effect on users valuable time and money also. Automatic monitoring of vehicle reduces human work and effort of official registration, verification and making record of entry exit of vehicle with counting number of entrees using counter by making data base. The proposed system is capable to recognize any type of number plate within a fraction of a second. This combination of software as web page, OCR, MATLAB and hardware resolution camera, keypad, dc motor, LED, Buzzer gives us more automation in field of electronic and promoting making India dream who makes Digital India.

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