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AUTOMATIC NUMBER PLATE RECOGNITION SYSTEM FOR VEHICLE IDENTIFICATION USING OPTICAL CHARACTER RECOGNITION

S. R. Aher[1], Prof. N. D. Kapale[2]

[1]student,[2]professor
Department of Electronics,
Sanjivani College of Engineering,
Kopargaon, India

Abstract- *Automatic Number Plate Recognition (ANPR) is an exceptional type of Optical Character Recognition (OCR). ANPR is a image handling innovation which distinguishes the vehicle from its number plate consequently by advanced pictures. In this paper we have introduced a observation for vehicle number distinguishing proof in view of Optical Character Recognition (OCR). OCR is utilized to perceive an optically prepared printed character number plate which depends on layout coordinating. This calculation is tried on various encompassing brightening vehicle pictures. OCR is the last stage in vehicle number plate acknowledgment. In acknowledgment arrange the characters on the number plate are changed over into writings. The characters are then perceived utilizing the layout coordinating calculation.*

Keywords- Automatic Number Plate Recognition (ANPR), Optical Character Recognition (OCR), Template Matching

1. INTRODUCTION

Number plate acknowledgment is a type of programmed vehicle recognizable proof. [2] A number plate is the one of a kind recognizable proof of vehicle. [3] It is a picture preparing innovation used to distinguish vehicles by their own particular number plates. Constant number plate acknowledgment assumes an essential part in keeping up law requirement and keeping up movement rules.[5] It has wide applications ranges, for example, toll court, stopping region, exceedingly security territories, visitor's regions and so forth. Number plate acknowledgment is intended to distinguish the number plate and afterward perceive the vehicle number plate from a moving vehicle consequently. Programmed number plate acknowledgment has three noteworthy parts: vehicle number plate extraction, character division and Optical Character Recognition (OCR).[6]Number plate extraction is that phase where vehicle number plate is recognized. The recognized number plate is pre-prepared to evacuate the clamor and after that the outcome is passed to the division part to portion the exclusively characters from the removed number plate. The divided characters are standardized and gone to an OCR calculation. [7] At last the optical character data will be changed over into encoded content. The characters are perceived utilizing Template coordinating. The last yield must be through series of characters. In this framework, another thought is appeared for Automatic number plate acknowledgment framework for vehicle recognizable proof and control reason. Programmed Number Plate Recognition is a picture handling innovation used to distinguish vehicles by their number plates. The Vehicle Number Plate is a special recognizable proof number for each vehicle made. Dissimilar to enrollment number, number plate does not change all through the lifetime. Since the 21st century, with social advancement and change of expectations for everyday comforts, the quantity of vehicles is constantly expanded. [8] The movement conditions are exacerbating, which conveyed immense weights to the general public and condition. Number plate acknowledgment framework can take care of the different street issues produced by the activity clog, in this manner getting increasingly consideration. Programmed number plate acknowledgment has three noteworthy parts: vehicle number plate extraction, character division and Optical Character Recognition (OCR). Number plate extraction is that phase where vehicle number plate is recognized. The identified number plate is pre-prepared to evacuate the commotion and afterward the outcome is passed to the division part to section the separately characters from the removed number plate.[10] The divided characters are standardized and gone to an OCR calculation. Finally the optical character data will be changed over into encoded content. [8]The characters are perceived utilizing Template coordinating. The last yield must be through series of characters. This filled in as an inspiration to build up a minimal effort brilliant camera with a committed equipment unit for the extraction and recognizable proof of the vehicle number plates utilizing Optical character recognition.[10]

2. LITERATURE REVIEW

Optical Character Recognition (OCR) is broadly utilized innovation which changes over filtered pictures of printed content, written by hand message characters into machine encoded content data, for example, ASCII. It can be perceived printed characters and written by hand characters yet the execution is straightforwardly reliant from the nature of information records. The OCR performed disconnected.

K. K. Kim et. al. [1] is entirely intended for Korean plates. It has planned a framework executing for Support Vector Machines and report amazing normal character acknowledgment.

M.A. Ko et. al., T. Naito et. al.[2] [3] displays most optical character recognizers presented in a 2D-plane can keep up high achievement rate just inside a constrained scope of visual edge and shooting separation.

X. Dish et. al. [4] proposed a two phase cross breed acknowledgment framework joining measurable and auxiliary acknowledgment technique. This work incorporates Distinguishing comparable characters by nearby auxiliary elements and building up a framework engineering consolidating measurable and basic acknowledgment techniques. To begin with, the four sub-classifiers autonomously perceive the character and after that acknowledgment results are consolidated utilizing the Bayes technique. Furthermore, if the perceived characters have a place with the arrangements of vague characters the auxiliary stage is utilized for further choice.

Y. Huang et. al. [5] presents to identify the number plate in the procured picture caught from camcorder. The angle administrator is utilized to find the plausible number plate range, the otsu strategy used to binarize the picture and the layout coordinating for acknowledgment. The root-mean squared-mistake (RMSE) utilized for figuring closeness of a model and double picture.

Parul Shah et. al. [6] presents a novel calculation for vehicle undercarriage number recognizable proof in view of OCR utilizing manufactured neural system. This technique gives extensively high incentive for right distinguishing proof rate alongside zero wrong recognizable proof rate. The caught picture is contrasted and all the database pictures of alphanumeric characters and after that the most encouraging character is picked. Along these lines the acknowledgment procedure is finished. This technique is very quicker than the element coordinating methodology however we need to trade off with the precision of acknowledgment.

Muhammad Tahir Qadri et. al. [7] presents programmed vehicle distinguishing proof framework. The OCR techniques in this are touchy to misalignment and to various sizes. Along these lines, the fundamental contrast between Template coordinating and Machine Learning methodology is that Template coordinating is a Shape-Matching methodology however machine learning methodology is a Feature-Matching methodology. Along these lines, the time required to prepare any framework for highlight coordinating methodology is very long. In this venture we accepted a controlled situation, the format coordinating methodology is use to lessen the aggregate calculation of the ALPR framework.

S. Hamidreza kasaei et. al. [8] presents a continuous and hearty technique for auto number plate discovery and acknowledgment. Morphological administrator is utilized to find the number plate and format coordinating for character acknowledgment. This strategy sets aside much opportunity to assess yet the exactness of acknowledgment is high. The second technique, format coordinating strategy essentially measures the straight connection between the caught pictures and the database pictures . This technique absolutely depends on the nature of the caught picture.

The Automatic Number Plate Recognition was invented in 1976 at the Police Scientific Development Branch in the UK. The review process was adopted by surveying the research in last 5 years (2010-2015) for collection of information about Automatic number plate recognition issues. In the Existing system extensive research has been done in the area of number plate recognition since its invention in the year 1976.This is the topic of recent research attracting several papers around the world. By taking an overview on studies of Automatic Number Plate Recognition from the past few years [2] it is still a challenging task to detect characters from number plate.

3. PROPOSED APPROACH

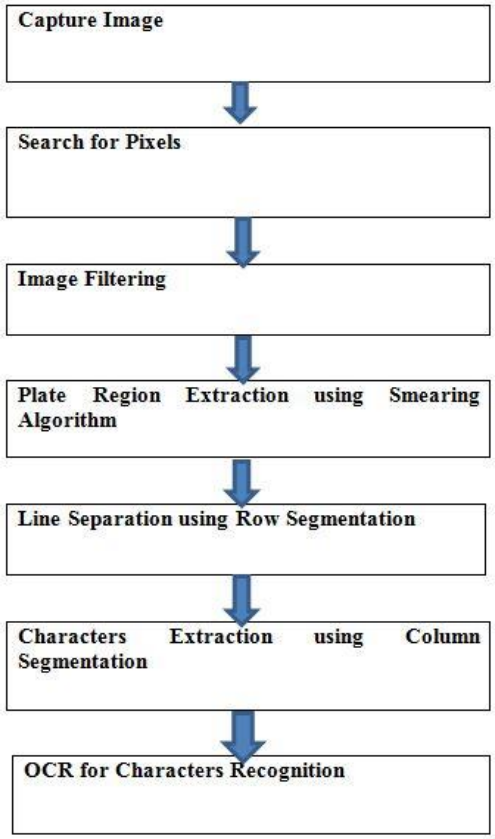

Fig 1 Steps of Automatic number plate recognition software model

The projected system is to observe every character from range plate one by one. This could be done by morphological operation. It includes a way to section all the characters employed in the quantity plate. Range plate extraction is that stage wherever vehicle range plate is detected. The detected range plate is pre-processed to get rid of the noise then the results passed to the section half to segment the one by one character from the extracted range plate. The divided characters normalized associate degreed passed to an OCR formula. Ultimately the optical character info is going to be regenerate into encoded text. The characters recognized exploitation template matching. The ultimate output should be within the type of string of characters.

4. SYSTEM OVERVIEW

a. Automatic number plate recognition system

The presented system Automatic number plate recognition system is aimed to be light weighted so that it can be run as real time for all environmental conditions. The Automatic number plate recognition system works in three steps. The first step is the detection and capturing a vehicle image, the second steps is the detection and extraction of number plate in an image. The third step is to use image segmentation technique to get individual character and optical character recognition (OCR) to recognize the individual character with the help of database stored for each and every alphanumeric character.

b. Phases of Automatic number plate recognition system

Automatic number plate recognition system work according to the following given phases:

1. Obtain image : Image need to be captured first and the image should not be blurred so that system should be able to do necessary processing on image for number identification.
2. Number Plate Separation : The number plate needs to be extracted from the whole image.
3. Number Plate Segmentation: Segmentation is performed on extracted image. Through Segmentation the extracted image is divided into many segments for further processing.
4. Number Identification: Noise needs to be removed from the image for proper number identification. The final phase of Automatic number plate recognition (ANPR) is Number identification.

c. Hardware Block Diagram:

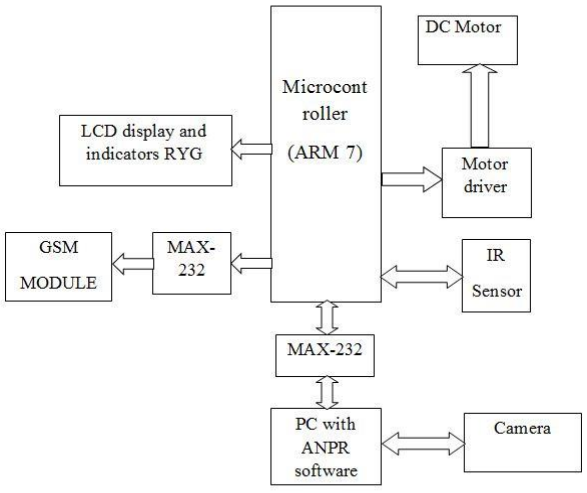

Fig 2 Hardware Block Diagram

The hardware model consists of following components like IR sensors, camera, motor with motor driver, PC with ANPR

software ,LCD display, Indicators ,GSM module ,MAX 232 and Microcontroller(ARM 7).

1. IR SENSORS: To sense the presence of a vehicle

2. CAMERA : To capture the image

3. MOTOR WITH MOTOR DRIVER CIRCUIT : To control the barrier on the entrance.

4. PC WITH ANPR SOFTWARE: PC on which algorithm is executed.

5. LCD DISPLAY: To display the recognized number plate.

6. INDICATORS (RYG): For indication of "Access Granted"and "Acess Denied" purpose of vehicles.

7. GSM MODULE: To send the message to the respected mobile number.

8. MAX 232: For interfacing purpose.

9. MICROCONTROLLER (ARM 7): For controlling the complete hardware of the ANPR system. It shows Hardware setup block diagram of Automatic number plate recognition system. As the vehicle enters and settles in the field of the sensor, the infrared sensor sense a vehicle and gives a signal to the PC through microcontroller ARM7 to capture the image of the vehicle. The camera connected to the PC through USB port captures the image of a vehicle. The ANPR algorithm on a PC receives the image and performs the processing, which yields the vehicle number. This number is then compared to the authorized number to confirm it validity and finally provides signal to microcontroller to control the system hardware. If the inputted plate contains the authorized number then the barrier on the entrance will be raised up using motor, green indication light will be switched ON and 'Access Granted' will appears on the display and if the inputted plate contains an unauthorized number then barrier will not be raised, red indication will be switched ON and 'Access Denied' will appear on the display.

5. SIMULATION RESULTS

This section shows the reenactment consequences of the created ANPR framework. Right off the bat, the camera is interfaced utilizing Matlab with the PC. The camera is connected utilizing USB port. Diverse pictures of autos having distinctive hues and structure sorts are taken and put away in PC. The diverse impacts of the daylights are additionally considered amid the handling. The pictures are in RGB design and the determination is 800 x 600 pixels as demonstrated . Subsequent to catching the picture the following stride was the yellow hunt calculation. The pictures after the executing the yellow inquiry calculation. The white locale speaks to the yellow or shading nearer to the yellow. It can be watched that the yellow pursuit calculation effectively identify the ROI that lone contain vehicle number plate. The spreading calculation utilized by concentrate the vehicle number plate as appeared. Once the vehicle number plate is removed, it is changed over into the parallel organization. It demonstrates the twofold and upset parallel organization individually. The line and segment divisions strategies are utilized alongside concentrate the individual character in the vehicle number plate. The consequences of the line and section division are demonstrated separately. At last OCR is utilized for character acknowledgment and every single alphanumeric character is perceived as appeared. The framework begins works when the sensor distinguishes the nearness of auto at the passage. The miniaturized scale controller sends.

Figure 3 Images taken using USB camera

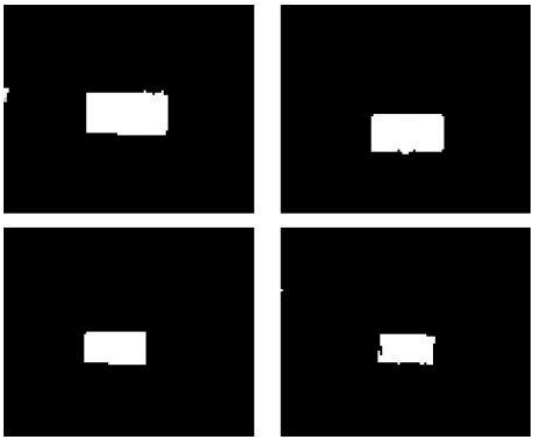

Figure 4 ROI detection using yellow search algorithm

Figure 5 Vehicle number plate extraction using smearing algorithm

Figure 6 Binary image

Figure 7 Inverted binary image

Figure 8 Line separation using row segmentation

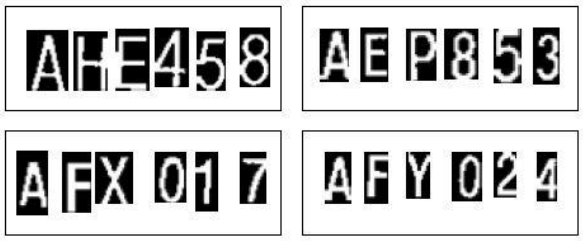

Figure 9 Character separation using column segmentation

Figure 10 Recognize character using OCR

The signal to PC for capturing image utilizing USB camera appended with the PC. The PC begins the ANPR calculation and distinguishes the vehicle approval. The ANPR calculation is tried on huge number of pictures with the determination of 800 x 600 pixels. The outcomes demonstrates that the created ANPR calculation effectively recognizes the Sindh standard vehicle number plates in different day conditions and demonstrates the higher identification and acknowledgment rate. It can identify and perceive vehicle plates from different separations. The separation influences the span of the number plate in a picture. Once the vehicle number plate is identified, the individual characters are perceived utilizing the OCR calculation. The OCR utilize relationship strategy for the character acknowledgment and the likelihood of the acknowledgment can likewise be ascertained. The framework is computationally cheap and can likewise be actualized for ongoing vehicle ID framework.

CONCLUSION

From the consideration of all the above points we conclude that in this framework, the Automatic vehicle distinguishing proof framework utilizing vehicle number plate is exhibited. The framework utilizes arrangement of picture handling systems for distinguishing the vehicle from the database put away in the PC. The framework is actualized in Matlab and it execution is tried on genuine pictures. The recreation comes about demonstrates that the framework powerfully distinguish and perceive the vehicle utilizing number plate against various helping conditions and can be executed on the passageway of an exceptionally limited ranges.

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