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Number Plate Recognition System using MATLAB

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Abstract: ***This paper presents a system called NPR (Number Plate Recognition) which is based on image processing and is used to detect the number plates of vehicles and process them to record the information. In a fast-growing world, it has become almost impossible to track illegal vehicles and store vehicle information. This is eventually leading to a rise in the crime rate, especially due to manual errors. The proposed system first captures the vehicle image and the vehicle number plate region is extracted using Image Segmentation in an image. The resulting data is then used to compare with the records on a database to come up with specific information like the vehicle's owner, place of registration, address, etc. Further, the system is implemented and simulated in MATLAB for studying feasibility and accuracy on a real image.***
Keywords: Number Plate Recognition, Image Segmentation, Feasibility

I. INTRODUCTION

Nowadays the population has become very vast. Due to this, usage of individual vehicles has become extensive over these years, it's impossible to keep the record of all the vehicles and there will be a need for assistance for surveillance to keep on tracking the vehicles, and it's highly impossible to store the data manually.

So, after the acknowledgment of such analysis and to overcome these limitations, we tried to develop a product that would be helping us to detect the number plate automatically and store the data, where even after years that data can be accessed easily. This data will be non-erasable and will be more accurate than the manual recording. The working process of this product begins when the vehicle enters into a particular area where we fix our product. This product will now take the picture of that vehicle and process it using the software which we have developed. The main purpose of this product is to verify the data of the vehicle which was recorded previously and now we process this through our software. If this number plate is being matched with the previous data, then this vehicle will be allowed through the gate or else blocked.

II. LITERATURE SURVEY

A paper by Ms. Shilpi Chauhan[4] has proposed a number plate recognition system and an algorithm that successfully detects the number plate region from the image which consists of vehicle number & then character segmentation, recognition. The project was designed keeping in mind the automation of the number plate detection system for security reasons that could replace the current system of manual entry. A paper by Narendra Singh Tomar[3] has proposed a project in which they made a software that detects the vehicle number plate number using MATLAB and image processing. It will be finding the plate number for four-wheelers. This software has limitations where the number plate background has to be white and the image should be clean and clear.

A paper by Dening Jiang[5] has proposed a License plate recognition system that has proved to detect the plate number effectively. The system output is just to show the recognized plate number as it is.

A paper by Ratnakar N [2] has implemented an algorithm for number plate recognition. The algorithm successfully detects the number plate region from the image which consists of vehicle number

A paper proposed by Bassel Shanwar [1] has designed an application software that detects the number plate of vehicles where the plate location is extracted using morphological operation then separates the characters using segmentation. Neural Network is mainly applied for the recognition of number plate characters.

III. METHODOLOGY

As per our requirement we divide our system into 2 categories I.e., hardware and software.

A. Software

The major role and important part of this system is software, as this uses image processing technology. This image processing tool is used from MATLAB., where we can find many toolboxes. Even now this algorithm is divided into two parts initially, we have to capture this image and dump it into MATLAB software using the 'imread' keyword, and net this software is used to pre-process the given data, next segmentation of character and resize the image, display of recognized character.

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B. Hardware

This software-based model can be made using hardware, which consists of a microcontroller to operate complete NPR. The algorithm on PC receives the data on the image and process which consists of the vehicle number. The number is then compared with the standard database and activates the microcontroller to produce output based on the input, the microcontroller starts working.

IV. WORKING PRINCIPLE

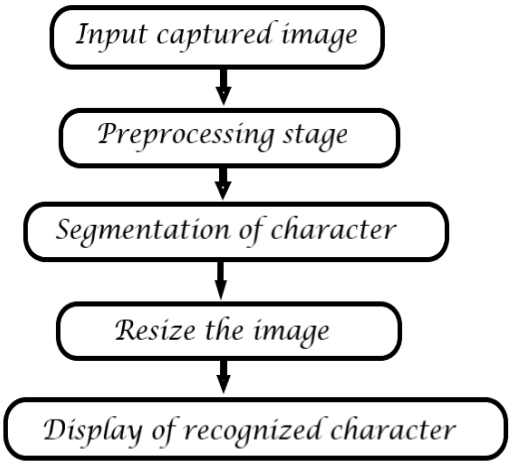


Figure 1: Work flow process of the NPR

1) *Captured Image:* Initially the image is captured using any digital device, where it is placed in the software in the form of png/jpeg. Now, this is formatted in the software accordingly.
2) *Pre-processing:* in this stage after capturing the image is processed, when the captured image consists of noise, in this stage using filters will be cleared to obtain an accurate result.
3) *Segmentation:* in this stage, the output of the given input image using labeling components, and split every character in number plate by using split and also finds the length of number plate and stores the character in some text file in the same code.
4) *Display:* The obtained character is compared with each input character stored in a database, OCR uses the correlation method to match the character.
5) *Experimental Result:* This section will provide the simulation of the project. Image of a car is taken and stored in pc. Hence the car image is as shown below



Figure 2: Car with a number plate

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The obtained output after the simulation through is as given below:

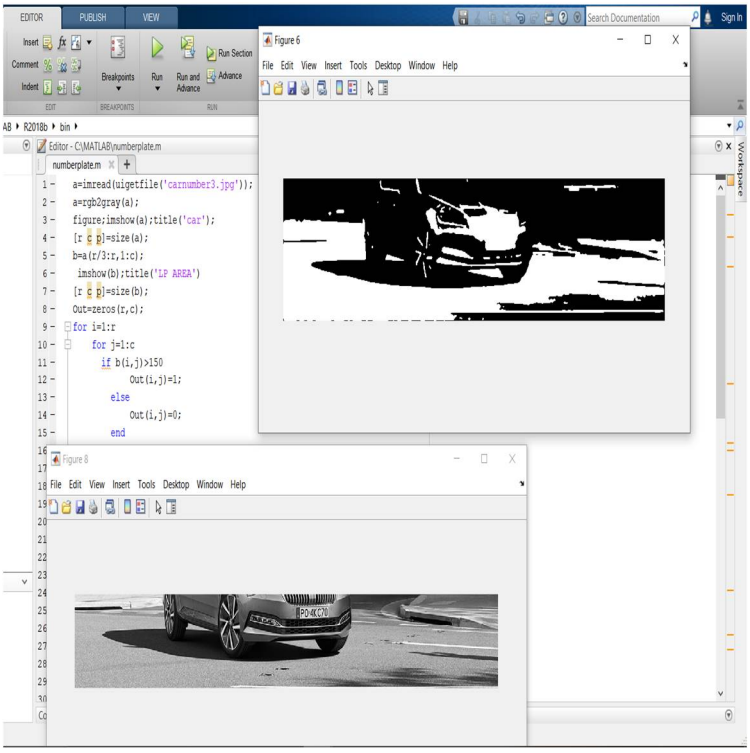


Figure 3: Output of the simulation

V. ADVANTAGES

A. Improves road safety -
B. Deterring terrorism
C. Reduces crime
D. Provides accurate information
E. No errors will be done.

VI. DISADVANTAGES

A. Uses low resolution images
B. Image will not be clear in every case

VII.LIMITATIONS

A. Our product may not be able to detect some gaudy looking number plates properly.
B. Our product may not be able to detect the number plate of the cars travelling at very high speeds.
C. The prototype sometimes has the difficulty of image processing.

VIII. APPLICATIONS

1) Traffic control - It will be helpful in traffic control by telling the number of vehicles in different areas.
2) Airport - It will be useful in airport parking to reduce frauds.
3) Tolling - It will be helpful at tolling poll to collect fine if vehicle found guilty.
4) Border control
5) Stolen cars

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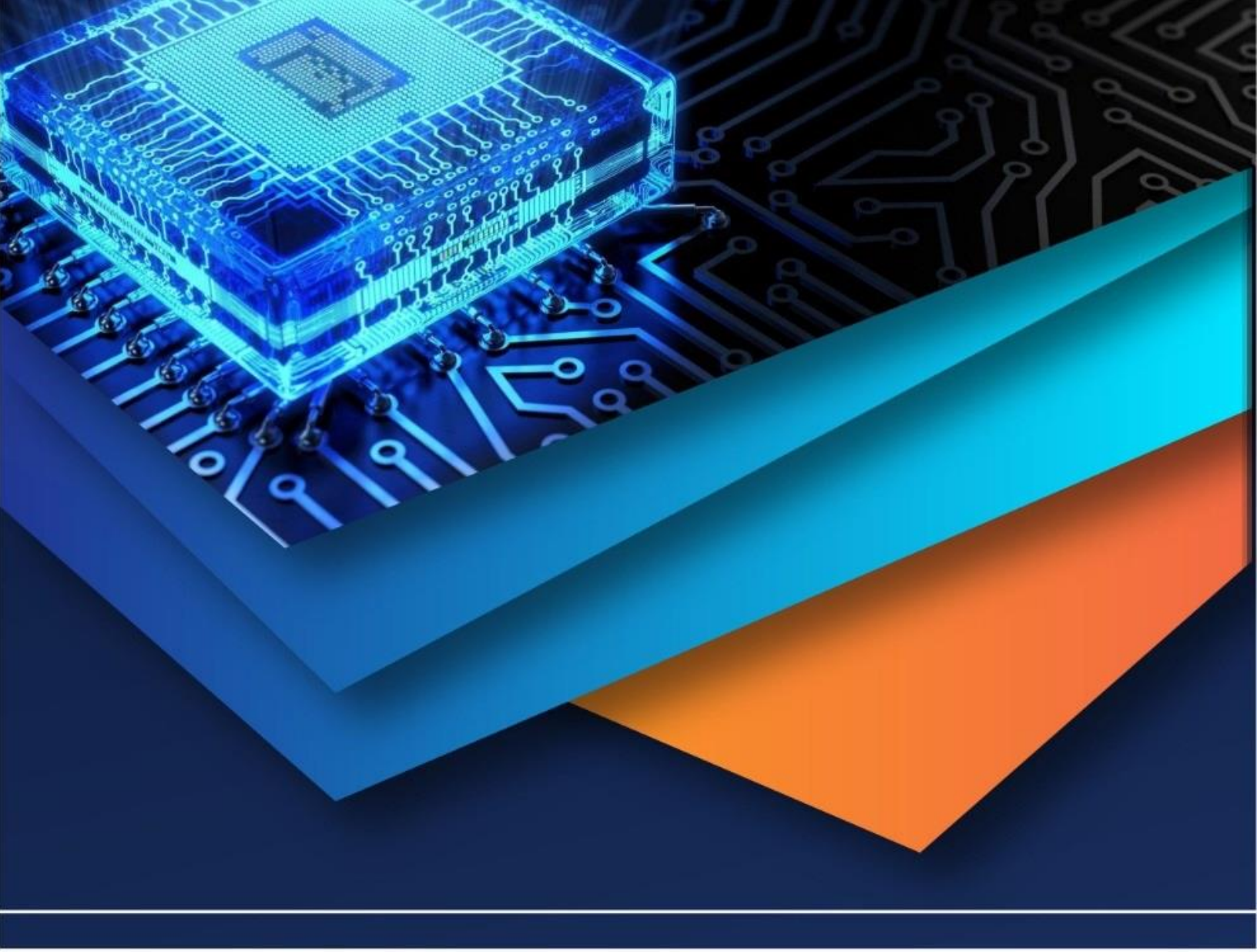
IX. CONCLUSION

In this project, we have developed a prototype that can detect the number plate using MATLAB and image processing. It has been tested at various cases and has turned out to be successful. However, it can sometimes be unsuccessful when the image is not clear or the number plate is gaudy. We can develop this project into a better one and more efficient by using various technologies like Artificial Intelligence.

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