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Recognition of Vehicle Number Plates and Real-Time Identification using Open CV

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Abstract: ***The automatic license plate recognition system, the detection and recognition of characters on the vehicle license plate and the classified characters are most commonly used in access control, security and traffic applications. Accurate car plate recognition (ALPR) has complexity characteristics due to various effects such as light and speed. Most commonly, LPR, included in image processing, uses proprietary tools like MATLAB.***
The most efficient and alternative technique for recognizing vehicle plates is open CV. In this OCR system, this is done using Open CV. The main difference between MATLAB and Open CV is the online and offline process. Which means that MATLAB can not be in the online process, it can be done ONLINE, while OpenCV is for real-time applications. This document presents another faster method for implementing LPR using Python Software and the Open CV Library.
Key terms: ALPR, Real Time, OpenCV, OCR

I. INTRODUCTION

ALPR, is the method of classifying the characters that are present on the license plate of the car that later turn out to be the recognized exits. Vehicle number recognition systems are common. The processing of images is mainly done through MATLAB. In recent years, license plate recognition (LPR) has been studied more extensively and many investigations are underway [1]. Many researchers have done a lot of work to find an efficient way to recognize the characters on the board. In the early stages of optical character recognition (OCR), this is done by a simulation method, such as the code executed in the MATLAB package. Automatic license plate recognition has come up for a variety of reasons and applications, mainly due to traffic monitoring and vehicle troubleshooting. Using the automobile license plate detector, the user can automatically track and identify vehicles. Now comes OCR, we used to read the character of the number plate, it is called the "Optical Character Recognition" method. Many important applications such as vehicle tracking, where automatic registration recognition plays a very important role in years of events due to the unlimited increase of the car, which makes management difficult, so we apply many algorithms to recognize the character who uses MATLAB and open the CV [2].
In the proposed system we have used Open Computer Vision, which is much better than MATLAB. OpenCV can be used for real-time applications. The main component analysis algorithm is used for resource extraction. The classification is done through the classifier called Convolution Neural Network, which is used to recognize the characters.



Fig (1) LPR

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II. OPEN COMPUTER VISION

Open-source computer vision library is a cross-platform platform and a set of programming functions used for real-time applications. The open CV library contains several algorithms and more than five hundred are optimized algorithms. It is mainly used all over the world, with fifty thousand people in the user group. The languages that were used initially and that are used in the open computer vision platform are C, C ++, the library is mainly written in C language, which makes it portable for some specific platforms, such as the Digital Signal Processor. Currently, the language called Python is most recently used and is designed to encourage adoption by a wider audience. These languages have interfaces of recent versions for C ++. Open CV is a multiplatform library, which has C ++, Python and Java interfaces. Open CV is made for computational efficiency along with a strong focus on real-time applications.

For now, Open Computer Version supports many optimized algorithms related to Computer Vision and Machine Learning and is spreading day by day. Currently Open CV supports a wide variety of programming languages, such as C ++, Python, Java, etc. and is also available on different platforms such as Windows, Linux, OS, Android, OS etc. Here, in this system, we are using Python as a coded language. This is called Python as open CV. We are choosing Python because it is very easy to understand and more efficient. The proposal combines the best quality of Open CV and Python.

III. ALPR USING OPEN COMPUTER VISION

The ALPR is also called a vehicle license plate or license plate. Recognition is nothing more than recognizing the characters on the license plate by means of the extraction method. In India, there are basically two types of boards, one is black on the white board and the other is black on the yellow board. Thus, the rating is based on the base plates of India.

Automatic Vehicle Plate Recognition (ALPR) is a computer vision technology to extract vehicle identification numbers from images. Associate the degree of integrated system that has several applications and challenges [10]. The typical ALPR systems area unit has reinforced patented victimization technologies and therefore the area unit is expensive. This closed approach also prevents further analysis and helps in the development of the system. With the growth of free and open source technologies, the world of information technology is rising to new heights. people from totally different communities work in a very multicultural environment to develop solutions to endless problems. Once in each of the community's notable contributions to the scientific world open Python [13]. The Open Computer Vision (CV) library, which could be compatible with the development of artificial vision, performs well in the image recognition technique, where in our proposal it has been used in real-time identification.

IV. PROPOSED SYSTEM

The proposed system has two sets of processes combined. The block shown below represents the Indian registration system which contains different types of sources with different origins when using a neural network. We can recognize the characters on the board without errors.

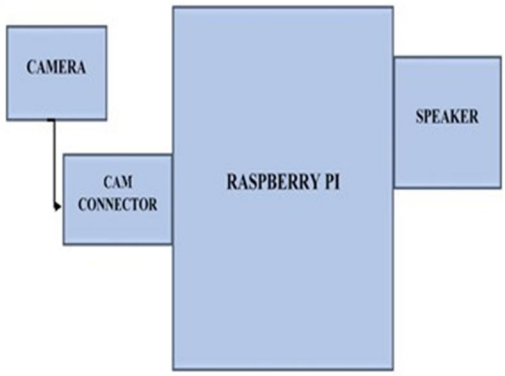


Fig (5) Hardware Block

Car plate recognition is recognized using several methods previously, such as MATLAB. These methods had some complexity to get accurate results, efficiency rate, time spent, etc. To overcome this complexity, the other method that can be used is Open Computer Vision. The language is used in Python, so it is called Open Computer Version.

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Fig (6) Hardware

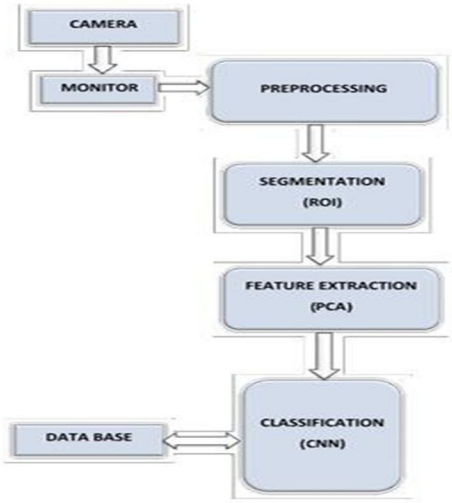


Fig (7) Image Processing steps

A. Real Time Input

The camera, which is connected to the Raspberry Pi, captures the car's image in front and processes the instant detection and recognition of the vehicle's license plate. We enter an image of a car that goes through the stages of image preprocessing and improves image quality for better results in the later stages. The input can be in the form of an image or a video. The process is done online, in other words, it leads to real-time entry to the domains.

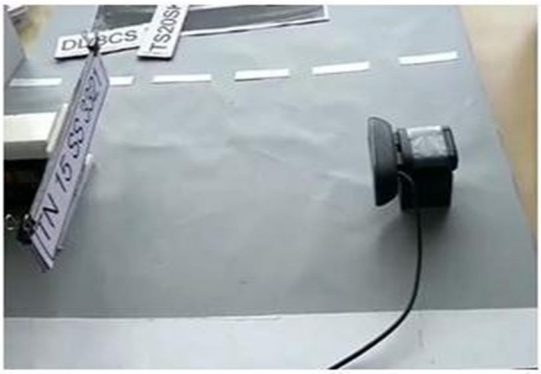


Fig (9) License Plate Image is captured (Modal)

B. Pre-Processing

Preprocessing is a very important step in any image analysis system, although it is not a correct preprocessing, the popularity is ineffective or it can provide undue results in later stages. The main reason for pre-processing is to enhance the image pattern that will be processed for recognition. Several processes that tend to advance in the area unit to apply the area unit by changing the RGB image to grayscale, noise reduction and image binarization. In Python, there are many packages available to perform this step.

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C. Segmentation By ROI

Character segmentation is done on the binary image of the extracted board. The algorithmic program used for a similar one is the horizontal scan that makes use of a scan line that finds the conditions that satisfy the initial and final position of the character.

D. Features Extraction Using Principle Component Analysis

The analysis of the main components of the algorithm is used for the extraction of characteristics. In PCA, the image is becoming gray images. Here the level of the images is extracted and is based on the various parameters and values of the matrix.

E. Plate Recognition

In recognition of a car's registration, where the characters are recognized is the most important step. This can be called as optical character recognition, where the segmented characters from the previous steps are recognized. The neural network is a good intelligence engine that can achieve higher accuracy recognition rates and faster recognition speed.

F. Classification By Neural Network Of Convolution

To recognize the efficiently segmented characters, we use the formation of artificial neural networks to train our system through a set of downloaded data. After this training, we used the same neuronal model to recognize the characters.

G. Recognized Character

The characters are recognized and displayed on the monitor, the output is the characters on the license plate.



Fig (13) Output Window

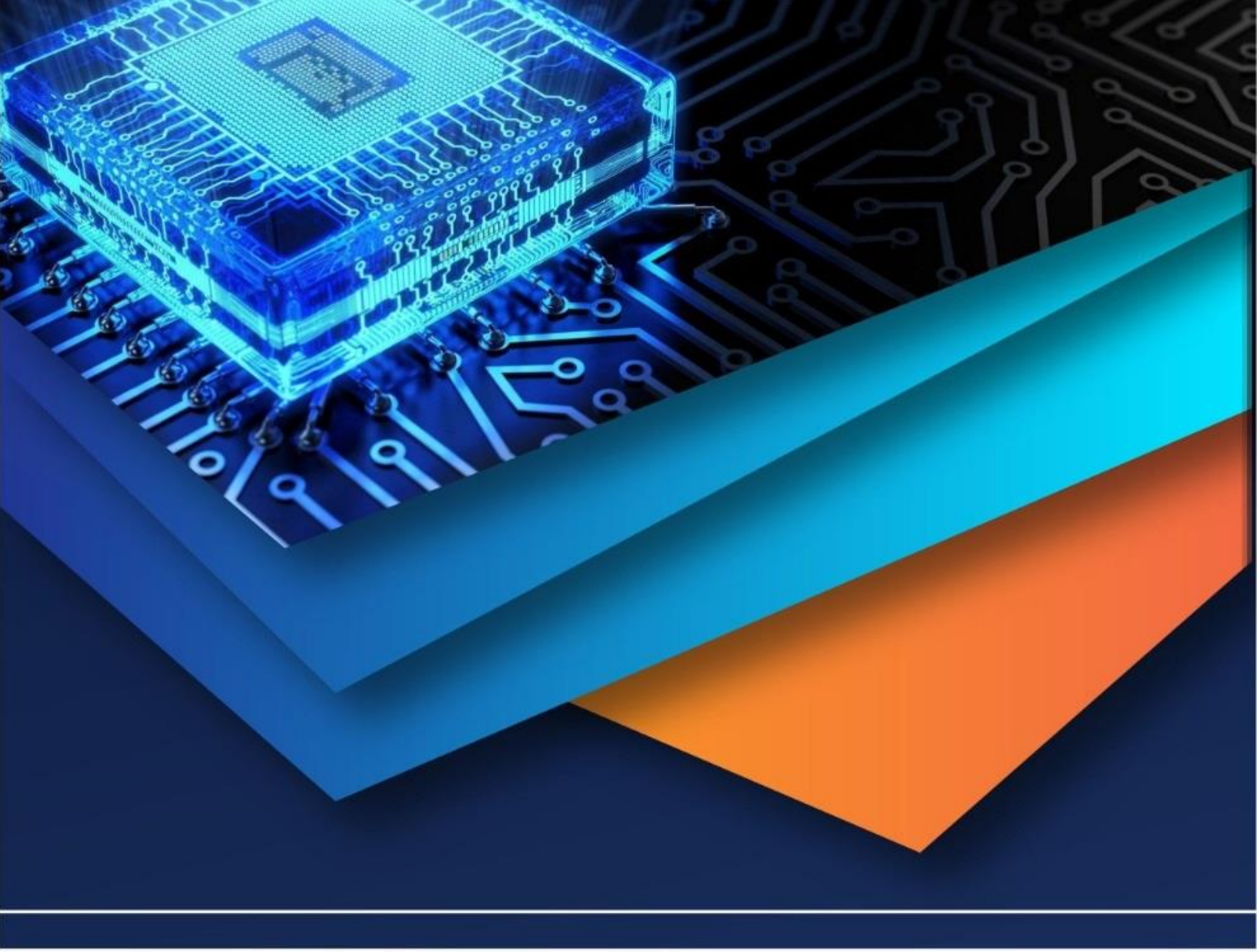
V. CONCLUSION

Therefore, this research should show that free and open source technology is mature enough for the domains of scientific computing. The system works satisfactorily for large variations in lighting conditions and different types of boards that are commonly found in India. When compared to the simulation process, it is safe, a better alternative for existing proprietary systems. We are currently proposing the algorithms for our ALPR system. In the future, we would implement this system in the Open CV library and also verify the performance of the designed system. The appropriate algorithms for this application were chosen and the process was executed and executed successfully.

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