AUTOMATIC NUMBER PLATE RECOGNITION SYSTEM(ANPRS)

ABSTRACT

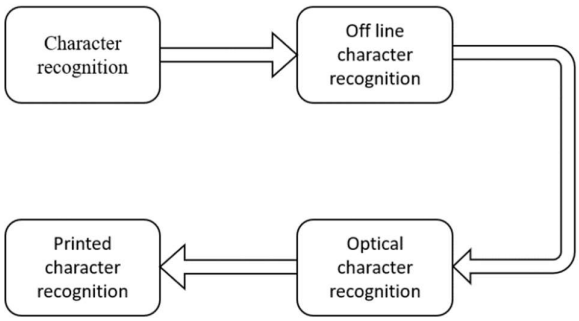
Every day, new technologies are developed in the world we live in. Books were the main information source in the past. OCR, or optical character recognition, is crucial for archiving the information gathered. OCR systems are required forvehicle license plate identifications due to the necessity for vehicle reconstruction between reality and the information system. OCR transforms written data into a format that is machine-readable. With this style, information is always available wherever you are. The inscriptions on the number plate are retrieved from the scanned image by the automated number-plate recognition (ANPR) system, which uses OCR technology. Using the retrieved characters, this technique enables the retrieval of several more vehicle-related facts. The concept is implemented using colored images of license plates. It consists mostly of two stages: the first stage involves text conversion from the number plate image, and the second step involves recognition processing. The majority of OCR systems use the same technique, which involves picture capture, pre-processing, character segmentation, and character recognition. The key benefits of employing OCR systems are their rapidity, reduced mistake, and less work.

Keywords:

MATLAB, OCR, ANPR, ACPS, Template Matching

INTRODUCTION

Real-Time Automatic Number Plate Recognition has been a common topic to study because of its many realistic applications, automated toll collection, visitor regulation enforcement, non-public areas get admission to control, and also traffic monitoring. There is an oversized range of vehicles in today's generation and the entire world. therefore it's important to stay track of vehicles. In today's world, we will use computers to stay track of any vehicles while not manually wanting to keep track of vehicles as a result that there'll higher accuracy. Thus recognition of the vehicle number plate system is a technology used to identify the license



Block Diagram of Optical Character Recognition

number of vehicles from video recorded by the security camera. It uses methods like extraction of license plates of vehicles, segmentation, character and number recognition on license plates, etc.

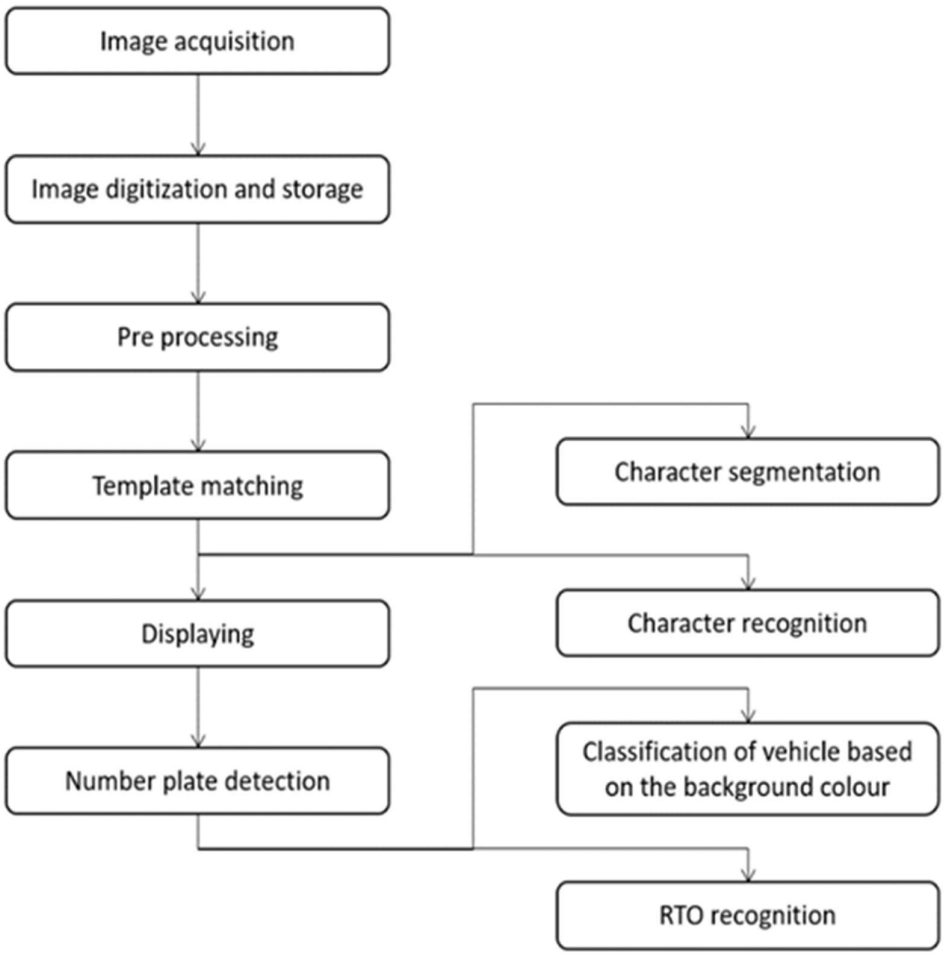
This algorithm is a blend of hardware plus software programs that makes use of the license plate and which sends these license plates to transform into the images and take a best-captured image. This technology will be able used at any reputed organization or private place entrance. Thus this algorithm can be accurate if the image extracted from the license plates captured by the camera is clear and visible. The image captured used should be of good quality. OCR , also known as optical character recognition, employs an optical system to automatically detect characters from scanned copies, photographs, etc. [5]. OCR is one of the ways to extract characters that can identify typed and handwritten letters by using a scanner and an algorithm by electronic way itself. When employing number plate recognition, which is an OCR application, the number plate is photographed and then recognized using the retrieved text. It is a method for automatically identifying vehicles. The term "automatic number plate reading" is another name for this method (ANPR). This ANPR was formerly employed for security systems that managed vehicle entry. The identification rates have recently increased from 65 to 75% as its dependability has been strengthened. Depending on how each character in the picture, which might be printed or handwritten, is extracted, there are several variants in the OCR system. Figure 1 displays every type of OCR.

LITERATURE SURVEY

On OCR and ANPR, there are a lot of connected works. The text is converted into a voice using an OCR engine called "Tesseract" in the article by Ravina Mithe and colleagues. The author, Rachit Virendra Adhvaryu, discusses the many OCR alternatives. Er has proposed a technique to test various vehicle photos with variable ambient light levels. Navneet Kaur and others. It has been determined that the accuracy is impacted by the camera's distance from the picture and template matching. In the paper, outcomes of number plate identification utilizing three different algorithms are compared. The author, Dr. Madhu Babu, has presented a technique in which the system determines the path of the car by comparing images of the license plate taken at several sites. The use of sensors is part of the concept here. To identify the characters, template matching was employed in the paper. The author provides a MATLAB-based program that dilates and performs morphological operations on the pictures. The ANPR system for Indian license plates is discussed in the paper. The study talks about shrinking images to keep a homogeneous data collection.

PROPOSED APPROACH

There are two kinds of ANPR-stationary and mobile ANPR is meant to capture pictures at high resolution in a single attempt. The mobile ANPR also captures images with multiple angles using different cameras. Once the image got captured then it is as opposed to real-time data to identify or verify the vehicle. The database contains real-time data and the partial database is updated after a certain time. Here we are going with the first type of ANPR Which is stationary ANPR using our database. we also have some data in the form of images which are previously present in it. The below-given figures show the different kinds of ANPR.



Steps of Automatic Number Plate Recognition

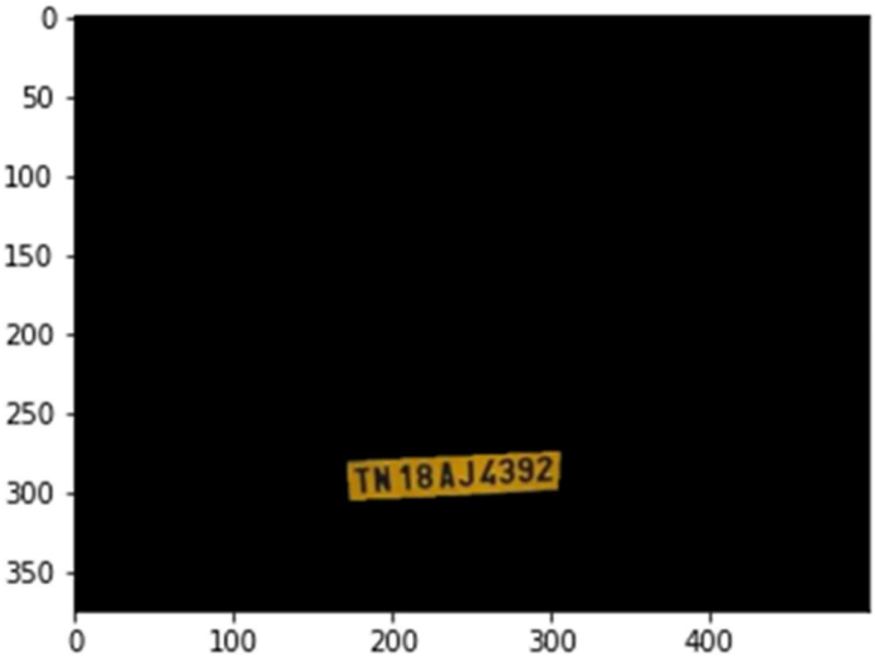
I. Image Acquisition

Here the image is denoted and defined as a two-dimensional (2D) function ad f(x, y), where (x, y) is a coordinate in two-dimensional space and I am denoted as intensity and a pixel is nothing position of coordinate. A pixel is a very very smallest particle or a little unit in the

image. A pixel is also known as a picture element. There are two processes of image acquisition they are sampling and quantization. There are two methods used to convert data and it is converted from continuous to digital form. sampling is a technique to find the values at the sampled point. the other process is quantization it is for representing or for showing the sampled values and takes only a limited set of values. the levels of quantization to be high for the perception of humans

II. Finding ROI

Here we select a specific region and discard or leave other regions to find accurate images. This process of selecting a specific region is called ROI(REGION OF INTEREST). We specify the ROI in the binary mask, these binary images further undergo the process. In the figure, we can observe the picture captured the region of interest.



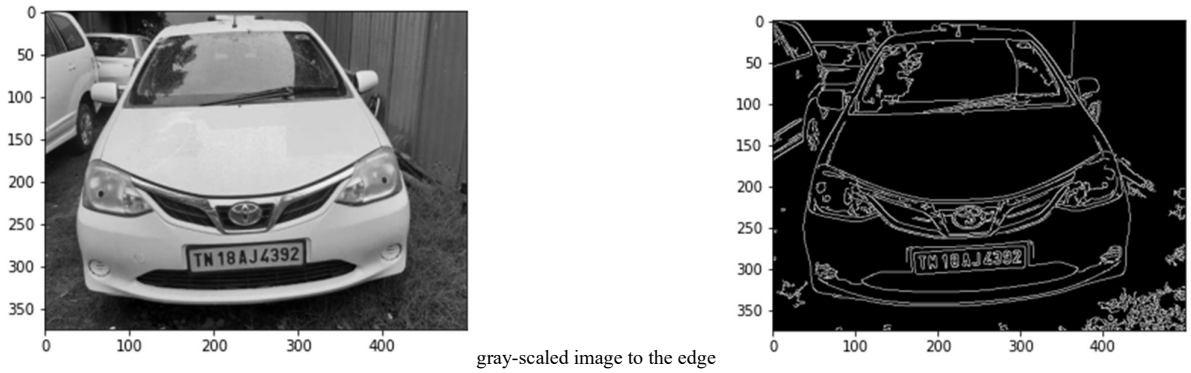
our region of interest

III. Pre-processing

This Pre-processing step involves many stages, it also has a particular stage of converting RGB into a grayscale image, here we calculate the threshold for the image, remove the lower pixel, determine the brightness of the image, adjust the brightness range, conversation of the grayscaled image to a binarized image and many more involved in it in case of optical character recognition the pre-processing steps acts a major role. In the case of character recognition

segments, the effect is very high and provides overall efficiency of the system. the model RGB represents a matrix M×N×3 similarly grayscale will be represented only in n×m matrix.

Here we go without altering luminance values for the conversation of RGB to grayscale by eliminating the colors and saturation components. By using otsu's method we have used global image thresholding. The image computes the threshold for high intensity and uses that value to binaries. The normalized value for the threshold is between zero and one (0 and 1) by using otsu's method we choose the threshold value to minimize the variance of the threshold black and white pixel. In the binarization of image method, we convert all pixel values of an image to align between only two values that Are [0,1] in the figure showing RGB gray-scaled and binarized images.



gray-scaled image to the edge

Picture of number plate

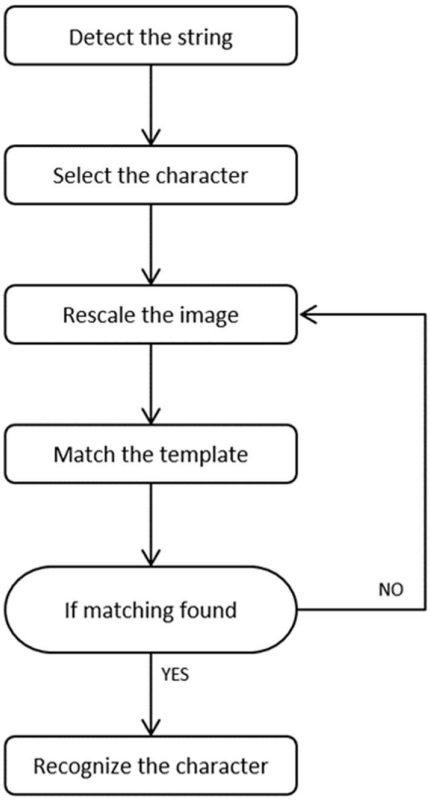
IV. Noise Removal

Getting rid of the noise in by removing the low-value pixels from the image. The function checks the binary image whether any input pixel values are less than input pixel values and removes them from the binary image, producing another binary image. Fig8 is the produced binary image.

V. Template Matching

This technique is quite different from others which includes extracting features and comparing. Template matching uses both character segmentation and character recognition to compare two matrices containing input image values. We compare the matrix which consists of an

image of each character directly with stored images. We'll be finding the breast match by finding the correlation between the present character image and other images in the training set. This process is depicted in Figure. Numerous OCR systems employ this simple, effective technique. This approach is, however, quite sensitive to character noise and style. The rotated character cannot be detected using any method. We employ Template Matching in our project since the photos of license plates have less noise, fewer stylistic variations, and are not rotated.



Workflow of template matching

A. Character Segmentation

In the process of optical character recognition, character segmentation is regarded as the decision-making step[3]. It is a method of breaking down photos into their parts. Finding the next image character in the document, extracting the picture's characteristics, and then comparing the extracted character with the current data set are all steps in the segmentation process of an image. Up to the final character of the picture, the same is repeated. The segmentation choice is made without reference to earlier outcomes. Line crop and letter crop are the two components. The latter crop is nested inside the line crop in the line crop's loop of operation.

Each line in the code is first recognized, and then each letter in the line is identified. Until every line and letter has been covered, this is done. We have just utilized the first iteration of

the loop because we are using the number plate detection and the number plate only has one line. Each line receives a letter crop. The line's characters can all be identified.

B. Character Recognition

Finishing the process of Character Segmentation, the Bitmap of each character is mapped to the corresponding char. This is attained by creating a global template of bitmap images of all characters, comparing bitmaps to one other, and obtaining the best match. Recognition includes two steps:

- creating the template.
- reading the character.

Default formatting and fixed content are specified by the Template. Templates are the set of bitmap images of every character of resolution 24*24. Reading the letter is a function of mapping. The function brings out the correlation between bitmap images and templates. The input image must be of resolution 24*24.

EXPERIMENTATION AND RESULTS

There are two kinds of ANPR-stationary and mobile Actually ANPR is meant to capture pictures at high resolution in a single attempt. The mobile ANPR also captures images with multiple angles using different cameras. Once the image got captured then it is as opposed to real-time data to identify or verify the vehicle. The database contains real-time data and the partial database is updated after a certain time. Here we are going with the first type of ANPR Which is stationary ANPR using our database. we also have some data in the form of images which are previously present in it. The below-given figures show the different kinds of ANPR. The accuracy of the OCR system is generally measured as a character and word accuracy. As the input includes a single word, the accuracy of the system is measured at the character level. The speed of the OCR system is measured in ACPS(Accurate Characters Per Second). The Figure shows the image of the number plate and the text extracted from the number plate respectively. As depicted in the figure. The outcomes include determining the vehicle's kind (Public or Private), reading the text on the license plate, and locating the RTO. The overall accuracy attained is between 90 and 100 percent, while the OCR system's speed is good.

Output Screenshots

LICENSE PLATE NUMBER
Tn 18AJ 392

CONCLUSION

The project's major goal is to use OCR to put the concept of automatic number plate recognition into practice. Our study focuses on the identification of license plates. This aids in record-keeping and traffic surveillance. In the project, we used a technique that is reasonably effective and simple to apply. The processing steps include noise reduction, format conversion, segregation, and recognition. We have educated the system in a way that makes recognition extremely accurate. The project primarily aids the traffic police in preventing public infractions of the law. The ANPR has changed as technology has advanced. It is helpful in a variety of vehicle-related contexts.