Automatic Number Plate Detection System

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Abstract— **Automatic Number Plates Recognition (ANPR) is a real-time in-built system that identifies characters directly on the license plate image. It is an active research area. Vehicle plate identification (VNPR) has been extensively studied in many countries. Due to diversity in number plates in different countries, the requirements for the default number recognition system vary from country to country. In this paper, a proposal for the local numbering of Indian car numbers is proposed. This program includes a variety of functions such as taking pictures, locating a number, cutting letters and OCR from alphameric characters. The idea behind the system is to plan and create effective image processing techniques and algorithms to create a license plate in place of the captured image, to separate the letters in that number using the separation and identification of each component character using the Open Computer. Vision Library. This is applied by the K-NN algorithm and the python system language. This system can be implemented in many applications such as security purpose, highway speed detection, light negligence, handwriting recognition, finding of stolen vehicles, automated revenue management systems.**

Keywords- Open CV, K-NN algorithm, identifying the vehicle, number plate recognition, OCR optical character recognition.

Introduction

During past years, Automatic number plate recognition system (ANPR) has become the most effective ways to monitor vehicles. It can be used in many public places for other purposes such as enforcing safety of vehicles, automated text-collection, vehicle parking facility.

ANPR algorithms are mainly divided into four stages: (1) Car input photo/video (2)Plate detection (3) Characters classification and (4) Characters identification.

As shown in Fig.1, the first stage which is of taking a picture of a car feels very simple but the work is already in progress as it is very hard to take a picture of a running car instantly in the absence of any part of the car especially the car number should be missed. Currently in most systems, the detection of the number plate and its execution duration is less than 50 ms. The completion of the fourth step depends on how well the second and third steps are able to detect the number of the vehicle and separate each character. We will conduct research and develop a plan that will be able to issue a vehicle number plate. Then, we also have to create a training algorithm and identify the vehicle license number for recognition purposes. The general algorithm involves the following steps:

- Image Processing: The image captured is preprocessed and results in reduction in contrast.
- Plate localization and extraction: To obtain the vehicle plate sub image.
- The RGB image is now converts into a gray-scale image, the purpose of this process is to enhance the visibility of the image.
- Character Segmentation/Recognition: Re-sample and limit for classification of license plate and vehicle number plates. Then the recognition of the car plate characters.
- OCR: Optical Character Recognition predicts the required output number plate.

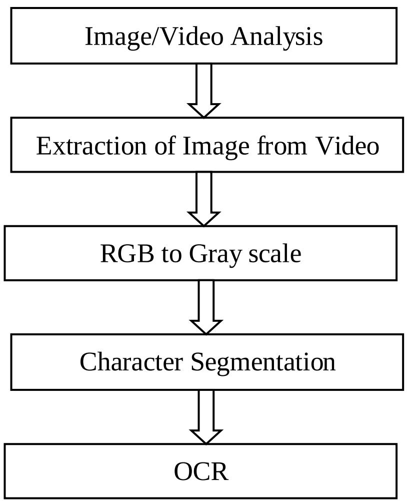

FIG.1

Objective

Automatic number plate recognition(ANPR) system is an image processing technology that deals with vehicle number(license) plate to identify a vehicle. The intent is to design an automated vehicle authentication system that works automatically using a vehicle license plate. The system can be implemented in traffic laws and regulations, Parking Management etc. It can also be used in the area of governance of all fully restricted areas such as defense bases and areas close to senior government offices for e.g. Military Base, Parliament, Supreme Courts, etc.
The advanced system detects the car first and takes a picture of the car. The plate number plate of the car is photographed using the image separator in the image.

Proposed Methodology

Fig.2 shows the illustration of the proposed ANPR process.

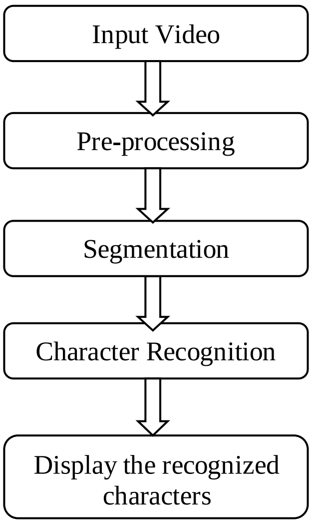

Fig.2 Proposed Process of ANPR system

I. Input Video

The initial phase of Vehicle Plate Recognition Sytem is image processing which is to obtain pictures of vehicles. Devices such as digital video camera(videocamcorder), webcam etc can be used for captureing images and videos. The adjustment of the vehicle plate recognition system is based on the captured input image. The input image that is in RGB format must be converted to a gray image. In this project, photos of the car will be taken with a portable camera as displayed in Fig. 3.

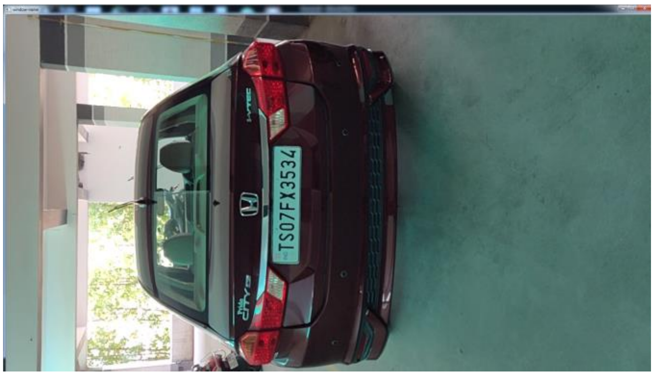

Fig.3 Input video for plate detection

II. Pre-Processing Of Image

Preprocessing removes unwanted data and enhances image by removing background sound, normalizing the particle size of each image, blurring the image and removing image reflection. Preliminary processing of a vehicle plate number uses three common processes, namely geometric operation, a gray coloring process and a binary process. In preprocessing stage, video is captured (Fig. 3) and then it is converted into gray image as shown in Fig.4.

The RGB image is proselytized into a gray-scale image for smooth analysis as it contains simply two color channels. The main goal of this procedure is to improve and increase the lucency of the image. These techniques of image enhancements include the procedure of whetting the edges of the image, noise reduction, distinct contrast, color image processing and image separation. The gray-image is then cut which is very attentive process in which we will remove a small polygon that will contain the border of the number plate and the number plate itself. Since, the surrounding license(number) plate is not important, this cropping process will greatly increase the image processing speed. The figure below shows the cropped image:

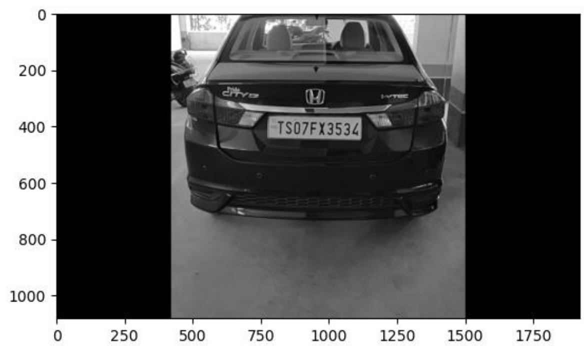

Fig.4 Gray Scale Image

III. SEGMENTATION

The next phase after processing is segmentation.
Character segmentation is a function that seeks to split a sequence image into smaller images for each character. Characterization is the preeminent important part in any OCR system because characters are the smallest unit in any language calligraphy. The main purpose of the character-level segment is to split an image into individual characters. Then, comes the goal of division which is to find regions that represent the logical parts of things. Separately, the image will be subdivided into regions based on research interest.

For this project, the various image classification methods used are:
Threshold-based classification,
Edge-based segments also,
Blend-based classification.
The technicalities of each method of classification are described in the following sections.

A. Threshold

In threshold-based image segmentation, we change the pixels of the image to make the image easier to edit. In the end, we change the image from color or grayscale to a binary image, that is, just black and white. Then we will set a limit to divide the image into categories. For example, if we consider the image pixels from 0 to 255, we fix a limit of 60. So all pixels having values less than or equals to 60 will be given a value of 0 (black) and every pixel has a greater value, there are 60 to be provided for the number 255 (white). By considering the background image and object, the image is divided into regions depending upon the size of the object and the background. But this limit should be set correctly so that the image can be separated into an object and a background.

B. Edge based segmentation

The edge-based segmentation depends on the edges obtained from the image using various edge-finding operators. These edges mark the image areas of non-continuation in gray levels, color, texture, etc. When we move from one place to another, the level of gray matter can change. So if we can get that not going on, we can get that limit. Various edge detection operators are available but the resulting image is the result of the middle split and should not be confused with the image with the final segment. We should do more processing on the image and go to the part of it. Additional measures include consolidating edge segments obtained into a single component to reduce the number of segments rather than smaller boundary components that may impede the process of circuit completion. This is done to get an infinite boundary of the object. The goal of edge segmentation is to obtain the effect of intermediate segmentation where we can use regional based or any other type of segment to obtain a final segmented image.

C. Clustering based segmentation

Clustering is a powerful method used to classify images. Cluster analysis is the division of image data set into the number of different groups or collections. Integration methods such as k means, enhanced k mean, fuzzy c mean (FCM) and advanced fuzzy c mean algorithm (IFCM) are suggested. K means integration is one of the most popular methods for your simplicity and computer efficiency. Blending techniques can be applied to any domain, eg any N-size or feature area, including local domain links. This method of performing image segments by placing similar elements in groups, or collections, based on a certain degree of similarity.

Fig.5 Localization of number plate

IV. CHARACTER RECOGNITION

The purpose of character recognition phase is to convert the images of text into characters. The main focus of OCR(Optical Character Recognition) is to distinguish visual arrangements(usually contained in the digital image) that are alphameric and other characters. The OCR technique involves a number of methods that include separation, feature removal, and separation. Each and every step is a domain in itself, and it is briefly described here in the framework of the python use of the OCR.Examples of OCR applications are inscribed in next lines. The most usual use of OCR is the first thing; people very often wants to translate texts into some form of digital representation.
1. People wish to scan a document and have a copy of that particular document found in the word processor. 2. Identify numbers of license plates. 3. The postal service office needs to see the zip-codes. Prior to algorithm recognition of characters are common. The practice is to filter the letters into a specific portion(or block) without any additional white spaces(pixels) around each sides(four) of the letters. Then every letter is equal to the same size. Measurement method is required to match the template. To compare characters with a website, input images must match the characters in a website. Now, the cut-out characters on the license plate and the characters on the website are of the same size. The subsequent step is to match the template. Template matching is an efficient algorithm for this method of character recognition. Then, the image of the character is

matched up to those on the website and the best similarities are rated. Estimating similarities and finding the best similarities, using the relational mathematical method. Communication is an effectual form of image recognition. This technique measures the coefficient of correlation between the number of recognized images with the same size of unknown images or parts of the image with the greatest coefficient of correlation among the images that produce the same quality best. For the identification of characters, the different characters in the panel of license must match with the templates that have been created previously.The procedure of recognition gives the license number in ASCII form and then it is saved in text document. In this case, a two-track process is recognized. In the initial world,attempts were build to recognize each and every word in sequence. Each satisfactory word is transferred to a flexible workbook as training data. A flexible workbook gets the opportunity to learn the text more accurately.

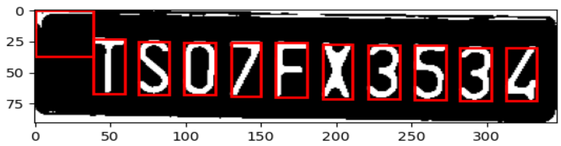

Fig.6 Character Recognition

Result

The system's preciseness in locating the number plate is greater than 98%. The problem experienced in the previous systems in locating the license plate when vehicle bodies and the number plates have same colours was overwhelm. Therefore by attaing higher precision in number plate abstraction step. As the font-style differ from one number plate to the another, complex situation may arise in recognizing these characters like "G" and "C", "I" and "1", "7" and "T" and after since OCR template was developed for one particular font. But a few of them were overwhelm by "Character categorization" approach.

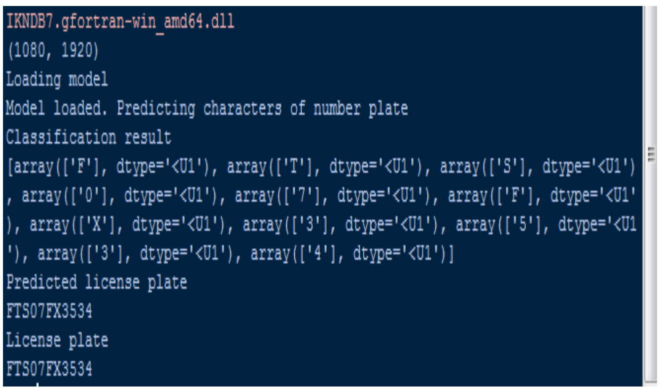

Fig.7 Result

Conclusion and future work

In this paper, we have proposed a character recognition method that efficiently removes the problem of mystification between the characters of the similar types as C&G where earlier algorithms could not able to do it, we have done it with more accuracy with the help of character segmentation. Preliminary testing showed achievement in distinguishing between same type of characters. The above-dicussed method, despite being more efficient than a ordinary number plate, has problem that it does not work on the plates that make use of unusual characters to characterize the registration number of the vehicles. The ways to use the aforementioned algorithm for identifying characters on plates of unusual car numbers will still be available. The purpose of this paper is to increase the recognition of license letters by using a combination of three key processes. All the trained and tested characters come from the following two important processes: the issuance of a license plate, the separation of the characters. As a rule, the efficiency of the character processing will affect the effect of the selected features, and then have a consequential impact on the impingement of the selected dividers. As expected, the test results show that our proposed combination of three key processes provides a very high level of recognition, which can reach 100% of KNN difficulty. Blurred and sloping snapshots provide worse recognition rates than a set of abstract snapshots.

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