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Research Article

Dynamic Transman Using ML

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Abstract

The main objective of this system is to optimize and also improve the cab booking system for an organization by many folds. This is achieved through a application through which an employee of an organization can book a cab and the ride is authenticated by an in charge. The cab availability is ensured through a ML algorithm, which captures the in and out time of a cab. If an employee wants a ride, he/she can select the available cab. Whenever an employee selects and requests a ride, a mail will be sent to the in charge allocated to that employee. After the in charge verifies and accepts a ride, the employee can start a ride .A ML algorithm is used to store the in and out time of the cabs. Hence the admin can Manage the availability of the cabs. Once the employee reaches the destination, a message will be sent to the particular in charge. Hence the safety of the employee is enhanced.

Introduction

Automatic number plate recognition (ANPR) can be used to store and process license plate images captured by cameras with a high rate of accuracy and efficiency. In ALPR we can enact different techniques based on varying conditions like, image quality, fixed car positions and multiple plates extraction. The ever increasing vehicle count in our roads have hindered the smooth flow of traffic. It finds great use in managing real-life applications such as border control, parking, motorway road tolling, journey time measurement, access control, road traffic monitoring etc. A vehicle in a country is distinguishably identified by a unique alphanumeric number, which will be depicted on its license plate. Systems commonly use IR cameras to take the picture. Due to a change or a distinct form in color, texture size, shape, and position of plate regions in such images the localization of plate regions is a challenging task. ALPR system completes the entire process passing through different stages. The stage is based on some features of the captured image to extract the license plate from the image. In

the next stage by projecting their color information we can segment the license plate. After that characters are extracted. Finally, recognition using template matching is done.

1.1 Open CV:

OpenCV (Open Source Computer Vision Library) is an open source computer vision and machine learning software library. OpenCV was built to provide a common infrastructure for computer vision applications and to accelerate the use of machine perception in the commercial products.

It has C++, Python, Java and MATLAB interfaces and supports Windows, Linux, Android and Mac OS. OpenCV leans mostly towards real-time vision applications and takes advantage of MMX and SSE instructions when available. A full-featured CUDAand OpenCL interfaces are being actively developed right now. There are over 500 algorithms and about 10 times as many functions that compose or support those algorithms. OpenCV is written natively in C++ and has a templated interface that works seamlessly with STL containers.

1.2 Django WebFrameWork:

Django is a high-level Python Web framework that encourages rapid development and clean, pragmatic design. Built by experienced developers, it takes care of much of the hassle of Web development, so you can focus on writing your app without needing to reinvent the wheel. It’s free and open source.

1.3 Python Tesseract:

(Python-tesseract is an optical character recognition (OCR) tool for python. That is, it will recognize and “read” the text embedded in images.

Python-tesseract is a wrapper for Google’s Tesseract-OCR Engine. It is also useful as a stand-alone invocation script to tesseract, as it can read all image types supported by the Pillow and Leptonica imaging libraries, including jpeg, png, gif, bmp, tiff, and others. Additionally, if used as a script, Python-tesseract will print the recognized text instead of writing it to a file.provides.

1.4 SaaS (Software-as-a-Service):

Saas(Software-as-a-Service) clients with the ability to use software applications on a remote basis via an internet web browser. Software as a service is also referred to as “software on demand”. Clients can access SaaS applications from anywhere via the web because service

providers host applications and their associated data at their location. The primary benefit of SaaS, is a lower cost of use, since subscriber fees require a much smaller investment than what is typically encountered under the traditional model of software delivery. Licensing fees, installation costs, maintenance fees and support fees that are routinely associated with the traditional model of software delivery can be virtually eliminated by subscribing to the SaaS model of software delivery. Examples of SaaS include: Google Applications and internet based email applications like Yahoo! Mail, Hotmail and Gmail.

Motivation

License plate detection application, most methods work under restricted conditions like specified illumination cameras, specified car positions, limited vehicle speed, and light conditions designated routes etc. We are mainly focusing on detection and recognition of multiple cars license plate from a single frame. Lp detection based upon combinations of mathematical morphology features and edge statistics produce high standard results

When a live video is given, the following happens, Numbers segmented are compared with data bases victimization totally different algorithmic rule and recognised. Image obtained once segmentation is done is Grayscale Before making ready the model for each of the characters for more use, we'd like to do some processing on the pictures. The subsequent are the operations that are performed. Binarization and Inversion of intensity of the characters. Realize the connected component that represents the character and realize the smallest rectangular region containing these connected components. [8]Then normalization of the image to size 15 x 15 is done. Store the intensity values victimization the below mentioned algorithmic rule for each of the characters. Now calculate the score for each of the characters. We tend to calculate the matching score of the characters segmented from the templates of the character hold on by the subsequent algorithmic rule. We then compare with the pixel values of the matrix of segmented character and also the model matrix, and for each match we tend [5] to add 1 to the matching score and for each mismatch we tend to decrement 1, which is done for all 225 pixels. The match score is generated for each model and also the one which gives the very best score is taken to be the recognized character. Character sets are used for recognition.

The following are the contributions of this study:

- Efficient car license plate detection and recognition system.
- Detect and recognize multiple car number plates in single camera frame.
- License with complex background are tracked correctly.

Architecture

Architeture of ALPR is shown in the fig.1. The two main steps for algorithm is divided into: Plate detection & Plate recoginition. In plate detection step licence plates are choosen from different countries depending upon the width and height. Segmentation and classification are the two main steps in plate detection. In segmentation stage, we use various filters, morphological operations, contour algorithms, and extract the region of image that contains the plate. In classification stage, we use a Support Vector Machine (SVM). ALPR system image is captured with an infrared (IR) camera. The various approaches and techniques used for ALPR system depends on different situations. From the camera frame we have to extract all the number plates. Each country has various plate sizes, languages and measurements. The proposed methods are for license plates from Spain, shown in the fig. 2.

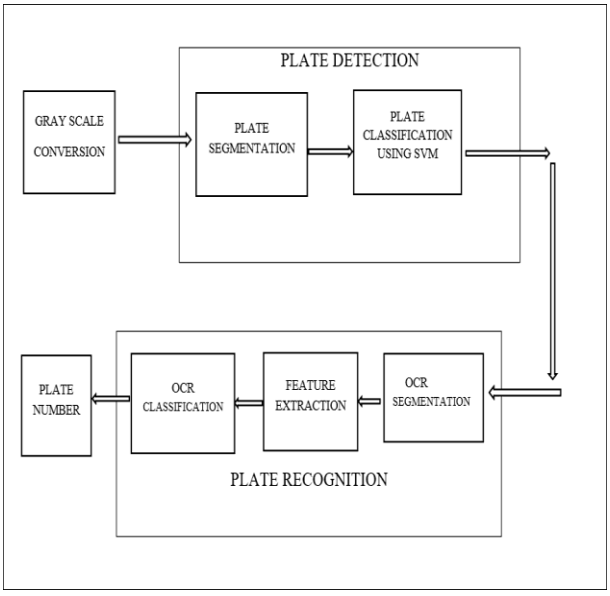

Figure 1 Block diagram of proposed method

Figure 2 Example of a license plates

Plate Detection

First step in the segmentation process, in which we divide the image into multiple segments.

Gray Scale Conversion:

First we want to change color image to gray scale image. License plate region contains large number of vertical edges which is the major feature of plate segmentation. In this step we remove the portions that don't contain any of the vertical edges. Before finding vertical edges we will remove all the noise. The gray scale conversion is shown below

Figure 3 Example of a Gray scale conversion on Indian license plate

Sobel Filter:

We use a Sobel filter to find the vertical edges. Here we calculate the first horizontal derivative. Gaussian smoothing and differentiation combines the sobel operator works shown in fig: 4.

Threshold:

We apply a threshold filter which is the simplest segmentation method using Otsu's method. Otsu’s method got a binary image with a threshold value. Otsu's method automatically determines the optimal threshold value. We can assign them a value of 0 for black, 55 for white or any value. The image obtained after thresholding operation is shown in fig.5.

Morphological Operation:

Close morphological operation that can process images based on shapes. Morphological operations are mainly divided into two: Erosion and Dilation. In this process we will have the possible areas that can contain plates. The object in erosion white is smaller. Process is obtained by the dilation of an image and then by an erosion, it is called Closing and it is useful to remove small holes in dark regions as shown in fig.6.

Figure 4. Example of a Sobel edge detection

Figure 5. Example of threshold operation on

Contours:

We have areas in the image that could consist a plate. Most of the portions will not include license plates. These portions can be divided by using the find Contours function extract the bounding rectangle. License plate contain parts detected based on its area and aspect ratio. Aspect ratio calculated by plate width divided by plate height. By using Flood fill algorithm the plate has white background and we can retrieve more effective contour box shown in figure 6 & figure 7.

SVM:

All possible parts of an images were pre-processed and segmented, by applying classification methods. To predict if each region is or is not a plate by applying support vector machine (SVM) algorithm. Supervised learning use labelled data for learning procedure. We train our classifier in the classification process. To create a DetectRegions class and SavingRegions variable. Fig.8 and 9 shown the number plate detection using SVM.

Figure 6 Example of Contours

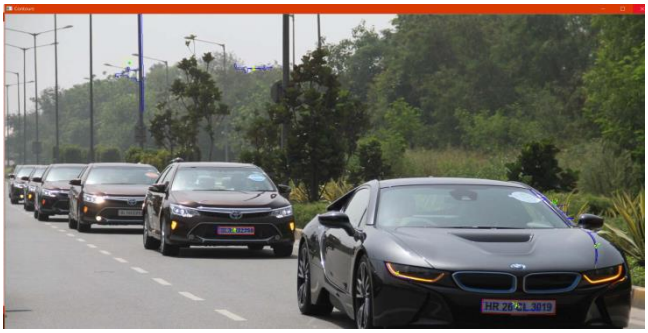

Figure 7 Example of Contours on Indian license plate

Figure 8 Number plate detection using SVM

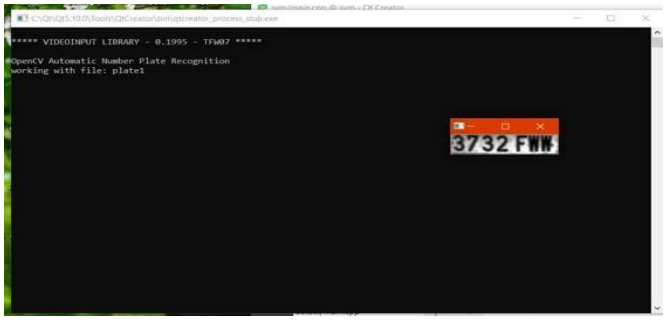

Figure 9 Number plate detection using SVM

Last stage of our method is Plate recognition using Spanish number plates only. After detecting the plate, the plate for each character is proceeded to segment, and machine-learning algorithm is used to predict the character. For plate recognition we use an Artificial Neural Network (ANN). First we apply OCR segmentation, using OCR

Technical design – in its simplest form, the end-to-end design will include the end-user device, user connectivity, Internet, cloud connectivity, and the cloud itself.

Text Localization:

We have observed that the accuracy of the system largely depends on the performance of the text localization algorithm. A lot of text localization methods [can be found in the literature but each of these methods have some limitations. We have to select a text localization method for such a system keeping three constraints in mind namely:

(i) Computational complexity,

(ii) Memory requirement, and

(iii) robustness.

Some of such methods are computationally expensive and thus we can not deploy them on a smart phone based EDGE device. Rest of the methods are either edge based or contrast based. We have observed that these methods give a lot of false alarm on our data set. So we have not used either of them to localize the text from the images.

In our proposed system, the text localization involves two phases, namely

(i) template creation

(ii) image recognition.

During the template creation phase, we have asked the cab hiring agency to send the properly cropped text region. The agencies usually have a limited number of cars (not more than 1000) in their possession which they roll over to different clients. So it is their one time activity to create a manually cropped image for each car.

On the other hand we have exploited the advantage of touch screen in the image capturing device. Our deployed method is similar to the method described. We have asked the security person to keep the number plate image within a predefined area of the screen. That designated area is marked as a rectangle by the application developer so that it becomes easy to crop the test image.

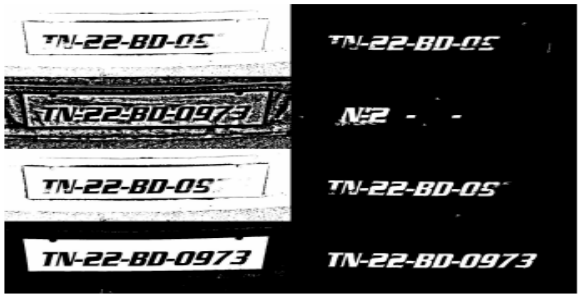

Figure 10 Binarization

Template Creation

In this phase we create the template that is used during recognition phase. This phase is a one time activity and the steps are as follows:

• Get the image from the car rental agency

• Binarize the image.

In our proposed method we have used the binarization technique described. The approach described in this work can select the best binarization technique for different regions of the image out of different binarization techniques like Otsu's method, Sauvola, Niblack and Wolf. Some images with their binarized images by applying different Binarization method is depicted. Run connected component analysis on the binarized image. Then apply a threshold based approach to remove small components as noises. De-skew the image. We have applied Hough transform to estimate the skew. Extract the features that have been defined. These feature vectors are Vertical Projection, Horizontal Projection, Contour, and Stroke direction. Store the cab details along with the features in a .XML file with the format: 448 Dimensional feature vector.

We have observed that the accuracy of the system largely depends on the performance of the text localization algorithm. Our deployed method is similar to the method described. We have asked the security person to keep the number plate image within a predefined area of the screen. This system will reduce the time consumed in coordinating the information received from the users and connecting them with the employees who uses cabs regularly. Hence the users managing cabs for any organization on a day to day basis will do less manual work compared to their current process. This is done by automatizing the entry and exit logs of the car entering the organization by image binarization which is done using OpenCV module. Also, all of this is done real time when the car enters the organization. A lot of text localization methods can be found in the literature but each of these methods have some limitations.

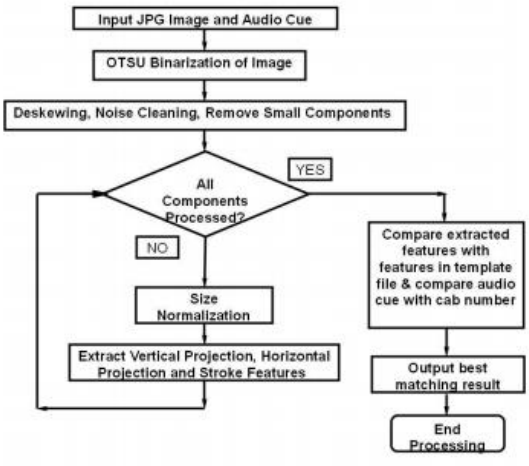

Figure 11 Flow chart of Number plate detection and recognization

Conclusion

In this proposed method we have used image retrieval machine learning approach to match the car number plate against an image in the template. In the proposed system we have used a technique which is computationally less expensive yet robust. Our method faces the major limitation when the binarization technique fails. We are trying to use multi-modal fusion where the security person is asked to speak the car number and subsequently Proceedings of the 19thInternational Conference on Digital Signal Processing speech recognition might be used to rectify the error of image.

Thus a completely unique methodology of car registration number plate extraction has been projected and check results are shown The method proposed above uses transform and horizontal projection profile each of that have economical and fast hardware implementation, to not solely extract the number plate however additionally at the same time segment out the characters. Thus reducing computation overhead further as introducing parallelism into the design makes it longer economical and time efficient. Further work in this direction is very much necessary to include all the possible complex cases and also consider minor rotation and skew. Thus a robust real time system can be developed at low cost.

This paper presents a successful and quick process for detecting multiple license plates both Indian and Spain. Automatic license plate recognition (ALPR) is used for location detection of the number plate. The advantage of our proposed method on multiple plates is its high accuracy in plate detection part. The proposed method detects multiple car number plates in single camera frame performed correctly. License with complex background are tracked correctly and obtained a good result.

When a live video is given, the following happens, Numbers segmented are compared with data bases victimization totally different algorithmic rule and recognised. Image obtained once segmentation is done is Grayscale Before making ready the model for each of the characters for more use, we'd like to do some processing on the pictures. The subsequent are the operations that are performed. Binarization and Inversion of intensity of the characters. Realize the connected component that represents the character and realize the smallest rectangular region containing these connected components. [8]Then normalization of the image to size 15 x 15 is done. Store the intensity values victimization the below mentioned algorithmic rule for each of the characters. Now calculate the score for each of the characters. We tend to calculate the matching score of the characters segmented from the templates of the character hold on by the subsequent algorithmic rule. We then compare with the pixel

values of the matrix of segmented character and also the model matrix, and for each match we tend [5] to add 1 to the matching score and for each mismatch we tend to decrement 1, which is done for all 225 pixels. The match score is generated for each model and also the one which gives the very best score is taken to be the recognized character. Character sets are used for recognition.

Figure 12 Car Number detection

Figure 13 Number Plate segmentation

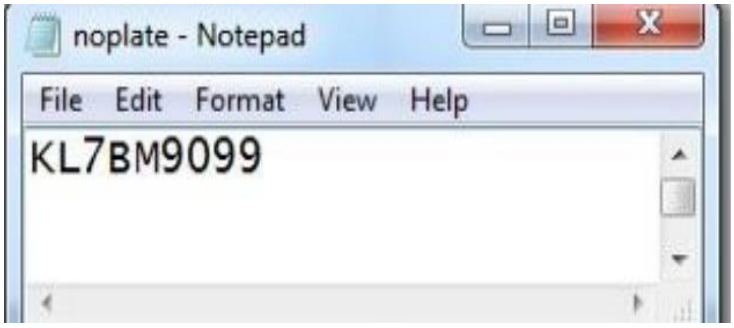

Figure 14 extracting data to test

Different Situations		Number of images	Accuracy (%)
Distance	Short (<5m)	30	98
	Normal (5m to 25m)	50	95
Angle	Low (<15°)	20	98
	High (<30°)	20	90
Low contrast		30	90

Figure 15 Data repesentation with respect to distance

Our system needs continuous internet connection so that at any given moment after detecting a violent act it can send Email to predefined authorities. We created a very simple user interface so that it does not bring any unwanted attention as this application. In GUI we can either load the video manually by attaching the video or by turning on the camera to capture the live stream. Once the data is captured it goes for data preparation where it will be processed under openCV to read the number plate.

Once the car enters the organization, it will save the current timestamp, date and time in the database. Then that data will be used to check the availability of cars.

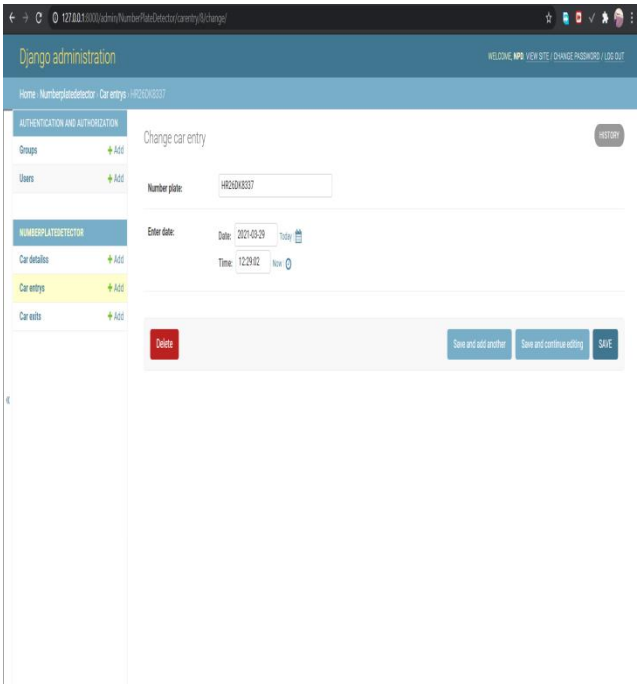

Figure 16 car number stored in database

Thus a completely unique methodology of car registration number plate extraction has been projected and check results are shown The method proposed above uses transform methods and horizontal projection profile each of that have economical and fast hardware implementation, to not solely extract the number plate however additionally at the same time segment out the characters. Thus reducing computation overhead further as introducing parallelism into the design makes it longer economical and time efficient. Further work in this direction is very much necessary to include all the possible complex cases and also consider minor rotation and skew. Thus a robust real time system can be developed at low cost.

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