

Entry and Exit Monitoring using License Plate Recognition

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Abstract— In the transport and traffic management system, tracking of vehicles on road is a prime importance vehicles are identified by reading their number plate, the existing system becomes complicated when there is a large number of vehicles being traced at different locations and therefore automatic license plate recognition ALPR is used to extract the contents of the number plate. The image can be fetched by using CCTV cameras with an MATLAB image processing tool. Besides these can be used for a surveillance purpose to facilitate the operations at the toll of many gated communities the identification of vehicles are done through vehicles through motion locating the license plate and accurately identifying the numbers in the license plate. Here we are going to use Adaptive Histogram Equalization AHE, Active contour method for region separation Optical Character Recognition OCR to recognize the characters and Deep Neural Network. DNN is used for classification and extracting the text as an alphanumeric characters and comparing the text with the predefined table created in MYSQL server and changing the status accordingly.

Index Terms— ALPR CCTV, License plate, alphanumeric characters, AHE, OCR, DNN, MATLAB, MYSQL.

I. INTRODUCTION

The Organizations of all standards maintains a general system for the vehicles for their needs some organizations keeps a detailed report of the attendance issues. An attendance system provides many benefits for the organization. There was a time the attendance of the vehicles and the employees use to mark at registers manually for each vehicles entering inside the organization. Now in this automated world of technology, the technology needs to play a vital role in each and every field. The Vehicle attendance monitoring made lives simple and elegant the vehicle attendance monitoring system makes the employee way of marking attendance of a vehicle a piece of cake.

In universities and colleges, parents are never being informed of the vehicle entering inside the campus or not. If it is done manually the record or registers can be exploited

easily by several circumstances and if it is automated the data are saved and it can be easily printed or a soft copy can be forwarded to parents via mail.

This system started to work with two processes namely Automatic process and Manual Process, the manual process are eliminated by an employee who needs to maintain it and is often difficult to comply with regulation but an automated system is valuable for ensuring compliance and regulation proof of attendance.

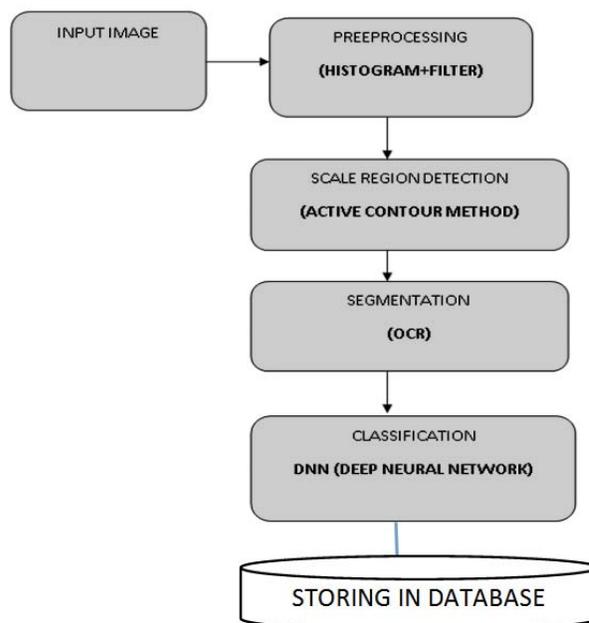


Fig. 1. Block Diagram of license plate recognition



Fig. 2. Image of license plate in English format with high luminance - Image of the standard number plate

II. LITERATURE SURVEY

Nauman Salim, Hassam Muazzam, H.M.Tahir proposed “Automatic License plate recognition Using Extracted features “ advantage of this concept is execution time was extremely fast it is stated as 0.5 seconds and the disadvantage is accuracy level is very low.

Pooja Sharma, Shanu Sharma proposed “Image Processing Based degraded Camera Captured Document Enhancement For Improved OCR Accuracy” Advantages of this concept is Noisy and Blurred images are extracted and the Disadvantage is extraction is poor with low resolution.

Soumitro Swapan auddy, Kanishka Tyagi, Son Nugen proposed”Discriminant Vector Transformations in Neural Network Classifiers” advantage of this concept is classification perfection is accurate and the Disadvantage is execution time is slower.

Younghui jia, Thomas Gannot, Jaffar Sanie, Proposed”Design Flow Of Vehicle Plate Reader based on RGB color Extractor” advantage of this concept is OCR accuracy is well optimized to 98.5% and the disadvantage of this concept is execution time is slow.

The existing system suffers from the following drawbacks:

- a) Only CCTV based monitoring.
- b) Only OCR based License plate recognition.
- c) Manual method of attendance marking and maintaining in records

III. PROPOSED SYSTEM

The proposed system offers the following advantages:

- a) Digital cameras are cheap, versatile, and handy
- b) The paper deals with OCR and Active Contour method for number plate recognition
- c) Active contour is widely used for color detection and region separation
- d) Deep Neural Network DNN method is used for classification with the trained table
- e) The median filter is used for noise reduction
- f) The result after classification is alpha numeric string
- g) The text is stored in a database and the stored text is matched with the predefined table created
- h) The matching of the text is done with JAVA with MYSQL queries

IV. PROPOSED ALGORITHM

The algorithm of the proposed system is given below:

- a) Input video recording CCTV camera
- b) Trigger camera as the number plate caught in the frame
- c) Get the image of the number plate
- d) Convert the image to a grayscale image
- e) Apply AHE to increase the saturation level and median filter to reduce the noise of an image
- f) Convert the image to a black and white image
- g) Then convert the image to a binary image
- h) Remove the edges (horizontal and vertical) apart from the boundary conditions using
- i) Using OCR identify the string presented in the license plate
- j) Using DNN classify and print then store it as a string
- k) Compare the string with the predefined data in the table
- l) Then print the Status

V. MODULES

The proposed work consists of the following modules:

- a) Camera module
- b) Preprocessing with AHE and median filter
- c) Scaled region detection with Active Contour method
- d) Segmentation using OCR
- e) Edge detection
- f) Classification using Deep Neural Network
- g) Matching values with the predefined Table
- h) Printing the status

A. Camera Module

An CCTV camera with the video recording capability is given as a input in order to record the moving vehicles, the camera is fixed at particular place so that it can record or capture the License plate in a frame whereas the camera triggering is manually operated by an employee.



Fig. 3. Image captured from one of the frames from the live running camera

B. Preprocessing with AHE and Median Filter

Preprocessing evolves with the conversion of RGB image to a gray scaled image in order to reduce luminance.



Fig. 4. Conversion of RGB image to a Gray scaled image

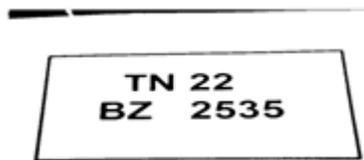
- *Adaptive Histogram Equalization (AHE)*— After the conversion of RGB image to a gray scaled image, apply Adaptive Histogram Equalization in order to increase the saturation of color.
- *Median filter*—During the equalization there is a possibility for minor noise that is said to be created in the image in order to filter noise the median filter is used.



Fig. 5. The saturated and denoised image

C. Scaled Region Detection using Active Contour Method

After getting the denoised image we need to convert the image into a Black and White image, after getting the black and white image the Active Contour Method is used to separate the scale region which means the foreground is noted by separating the background



(a) Black and White Image converted from the denoised image



(b) Scale region detected by Active Contour method

Fig. 6. Active contour method Based scaled region detection

D. Segmentation by using OCR

After the process of detecting the scaled image, the subject that is presented in License plate has to be converted to a binary image so that the characters presented in the license plate can be easily identified by Optical Character Recognition OCR.

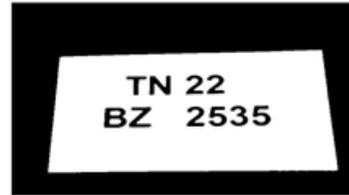


Fig. 7. The above given image is the binary image and the characters in the License plate are identified by OCR

E. Edge Detection

In order to remove the edges that is horizontal and vertical edges which is apart from the boundary lines are removed because it may give some complexity to the algorithm



Fig. 8. Edged image

F. Classification using Deep Neural Network

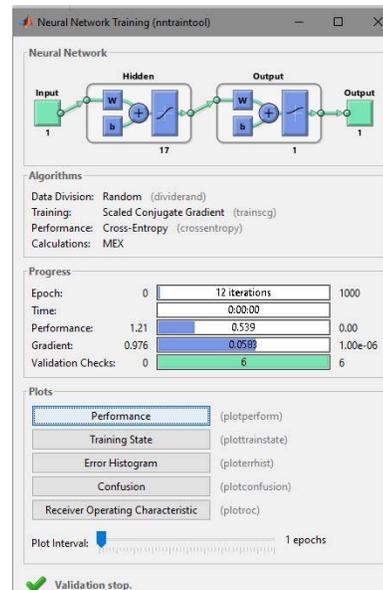


Fig. 9. The above image is the DNN performing the classification of characters presented in the license plate

The classifier algorithm DNN is used to process most accurate result after the OCR results, it is used to match the characters with the predefined trained dataset, it handles all sorts of alpha numeric fonts even hand written English fonts are also readable by using the Deep Neural Network classifier.



Fig. 10. The output of the DNN printing the alpha numeric characters



Fig. 11. The output of the DNN is opened in a notepad in (.txt) format and saved

G. Matching the Values with the Predefined Table

Initially turn on the main server program that should be always running to match the values that is generated by DNN classifier. Create the table of rows and columns as per our wish by using Queries that are used in MYSQL save all the number plate alpha numeric characters inside the table, whenever a number plate is recognized it gets stored as a text the java combined with MYSQL code fetches it and matches with the table

H. Printing the Status

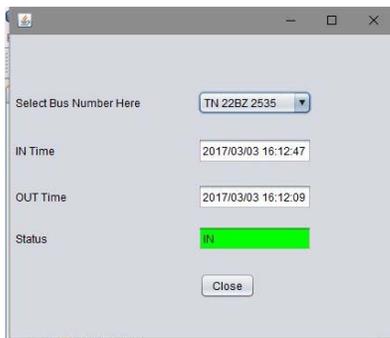


Fig. 12. Displaying the status for particular vehicle number

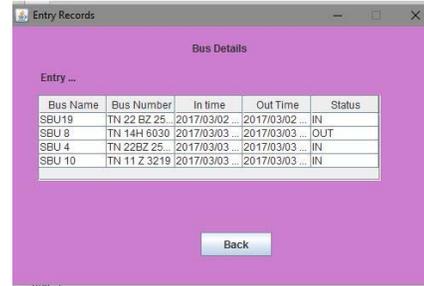


Fig. 13. Showing the Status of overall vehicle entry and exit details

As soon as the alpha numeric string of the license plate number gets matched with the predefined table then it changes the status of the particular row. Likewise whatever the number the MATLAB program generates the changes are done in the status only if the same alpha numeric string are already defined in the table.

VII. RESULT AND FUTURE WORKS

It can be said as the extraction of characters from the license plate and changing the status accordingly with comparing to the table works with an 100% accuracy level. This system can be widely used among the gated communities and other organizations in order to monitor their campus vehicle and to show their exact status of their campus

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