Character Recognition in video using Machine Learning Technique for Vehicle Registration Identification

[1]Namratha N K & [2]Shashidhara H S
[1]M tech Student, [2]Associate Professor
[1] Department of ISE,
[1]RIT, Bangalore,INDIA.

Received: May 24, 2018 Accepted: July 05, 2018

ABSTRACT *Character Recognition has been an important problem in image processing. Many algorithms exist taking care of individual processes during character Recognition. Most of them are well established. Here in this work, it is proposed to use machine learning techniques for character recognition in captured video and upload the same to the excel database. As machine learning is emerging fast, this work also serves as proof of concept in character recognition domain. The work proposed is specially targeting the vehicles number plates recorded at a place and has varied uses like capturing traffic violations, wrong parking, vehicle identification at the scene of crime etc.*

This project is proposed to determine the Automatic recognition of vehicle license plate number. Yet it's a very challenging problem, due to the diversity of plate formats, different scales, rotations and non-uniform illumination conditions during image acquisition. This project mainly introduces an Automatic Number Plate Recognition System (ANPR) using Morphological operations, Histogram manipulation and Edge detection Techniques for plate localization and characters segmentation. Artificial Neural Networks are used for character classification and recognition. From all these methods it became possible to detect the characters in vehicle license plate number to a greater precision compared to other character recognition algorithm.

Keywords: *Character recognition; ANPR system; morphological operations; number plate.*

I INTRODUCTION

AUTOMATIC licenSe plate recognition (LPR) plays an important role in numerous applications such as unattended parking lots to security control of restricted areas traffic law enforcement congestion pricing and toll collection automatically.

Because of various workplaces, LPR systems change from application to application. Most past works have somehow confined their conditions in working, for example, constraining them to indoor scenes, stationary foundations settled light , recommended garages constrained vehicle speeds or assigned scopes of the separation amongst camera and vehicle. The point of this examination is to reduce a large number of these limitations. Of the different working conditions, outside scenes and non-stationary foundations might be the two factors that most impact the nature of scene pictures procured and thus the many-sided quality of the systems required. In an outside domain, brightening changes gradually as daytime advances, as well as may change quickly because of changing climate conditions and passing articles (e.g., autos, planes, mists, and bridges). Also, pointable cameras make dynamic scenes when they move, container or zoom. A dynamic scene picture may contain various tags or no tag by any means. Besides, when they do show up in a picture, tags may have self-assertive sizes, introductions and positions. Also, if complex foundations are included, distinguishing tags can turn out to be a significant test.

Output Design

The output design is done in order to describe how to show the results of execution to the users. The output designs of character recognition system are designed in such a way that on performing the pre-processing of video the pre-processed video are displayed on the screen. We can see the pre-processed video on clicking the pre-processed video. On performing some operations the video is converted into frames which are classified as images. Then those images are subjected to pre-processing, segmentation, feature extraction and classification

II SYSTEM ARCHITECTURE

It describes the framework and the functions of the system. The system architecture is shown below

Overview of System Architecture

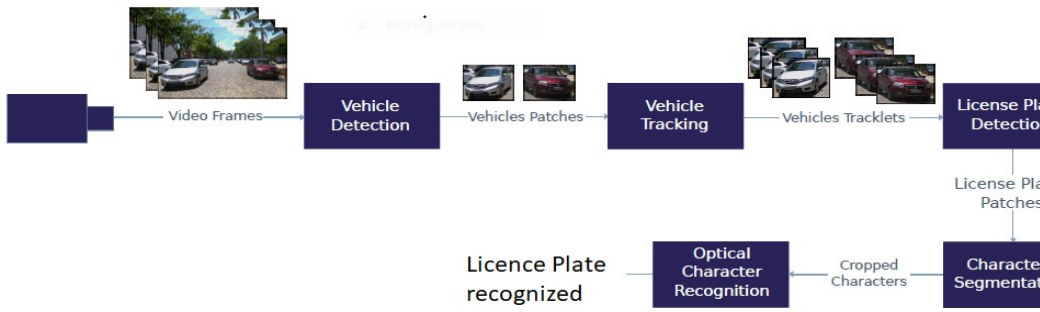

Fig1. System Architecture

Initially video is captured and loading the video as input. The video is splitted into frames by using open cv to a input video file. After splitting the vehicle is detected and the separated detected vehicles is saved as patches in one side. Next step is vehicle tracking, after done with tracking the steps as shown in proposed system is carried out. In Pre-processing the pre-process is done to remove the information which is not required. In segmentation level Otsu thresholding and some of the morphological operations is carried out. Morphological operations: Involves dilation and erosion process. Feature extraction: This step identifies area and shape of the number plate where texture is present. Classifying each and every character separately of all vehicles in the video and uploading the same in the database.

Initially the video is captured. After capturing the video we need to get the background frame. Getting background frame in the sense subtracting the background for vehicle detection and tracking. Before that we need to extract the frame for enhancement using histogram equalization. Next we are using DWT (discrete wavelet transform) algorithm through which we can reduce the storage space of images which will helpful to increase storage and transmission process's performance. The feature extraction carried in the next step. After feature extraction the rough location is determined through horizontal projection. After this add the recognized characters to the notepad. Next extract the characters based on vertical projection. After this extract the feature using machine learning. Then recognition is carried out, the recognized characters of vehicle number plate is uploaded in the database This Primary aim of this chapter is to determine whether the system is practical enough or not. Because of this reason various kinds of analysis like performance, technical, and economical analysis etc. is performed. The feasibility of this design is applied in toll gate videos, traffic signal videos.

III IMPLEMENTATION

The system plan is converted into operation according to system specification and requirements. To avoid misunderstanding the implementation should planned carefully. The implementation should meet the requirements specified. In order to convert the plan into action, Implementation plays important step because in implementation we are converting the design into proper programming language. To implement automatic number plate recognition we are using python language for coding.

The architectural pattern used in character recognition system is the model view pattern. It contains four components pre-processing, license plate segmentation, character extraction and character classification. This architecture pattern helps to handle the particular aspects of application. It helps to develop the scalable application.

Pre-processing:

Initially , we have to convert the input of the color image to the gray scale image. To increase the speed of the process the input image is downscaled to fifty percent of its original image. In pre-processing process the unwanted data is also removed

Pre-processing involves three main stages:

1. Gaussian blur
2. RGB to gray scale conversion
3. Soble edge detector

Gaussian blur:

Here in this phase Gaussian kernel is used. It is carried out with the function cv2.GaussianBlur().

It is a linear filter. Here Gaussian filter is used to reduce noise and blur the input image. Unsharp masking is also one of the application.
Advantage: It is faster because multiplying is probably faster than sorting.
At the first stage we have to make sure that width and height of the kernel should be positive and odd one. Gaussian filtering is highly effective in removing Gaussian noise from the input image.

RGB to Gray scale conversion:
Gray scale image is one in which the pixel of the gray scale image is single sample indicating the high amount.here the gray scale image carries only the information of the intensity . it is also called as monochrome image or black and white image with weekest intensity of black and strongest intensity of white. Since it called single channel processing. Why we are not using color image means because color image coding is difficulty and difficulty of visualization as well as speed. So we are converting color image to the gray scale image to speed up the process, avoid difficulty in visualization and make the coding part easy.

The Sobel edge detector:
The Sobel edge detector is one of the angle based strategy. The working of this process deals with a first order derivatives. Calculations is done separately for the x axis and y axis.
These values are just approximations because the image is not continuous. For approximation following method is used:

-1	0	1
-2	0	2
-1	0	1

horizontal

-1	-2	-1
0	0	0
-1	-2	-1

vertical

Kernels are used in sobel edge detector. Here the kernel on the side left indicates the derivative along the X-axis. And the right part indicates the Y-axis. By using these information magnitude or strength and orientation of the edge is calculated.

Magnitude of the edge is calculated by: $\sqrt{G_x^2 + G_y^2}$
Approximate strength is calculated as: $|G_x| + |G_y|$
Orientation is calculated as: $\arctan\left(\frac{G_x}{G_y}\right)$

Magnitude is calculated as: $\triangle = \text{mag} \quad f \quad (\triangle)$
$= \quad G_x^2 + G_y^2 \quad 1/2$

Where G_x is for x direction and G_y is for y direction. In which x for right direction and y for down direction.

IV License plate segmentation:
The segmentation process involves two steps:
1. Otsu thresholding
2. Morphological operations.

V RESULTS

Loading an RGB image:
The image whose number plate recognition is to be done is loaded.

Fig.5 Loading an image

2:**Grayscale conversion:**

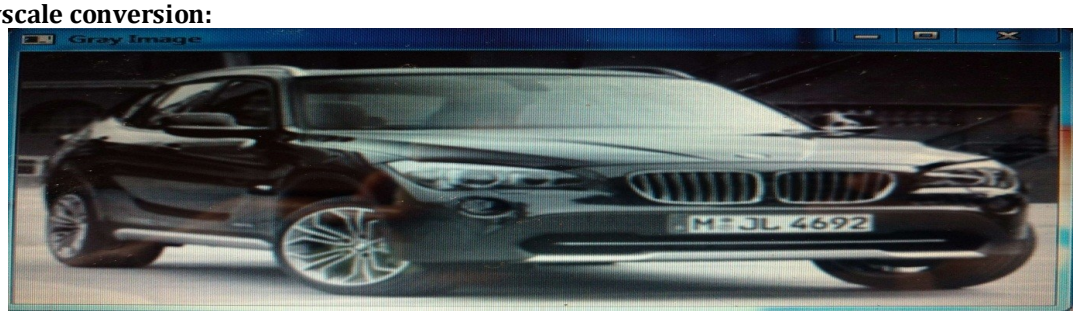

Fig 6. Gray scale image

3.Sobel edge converted image

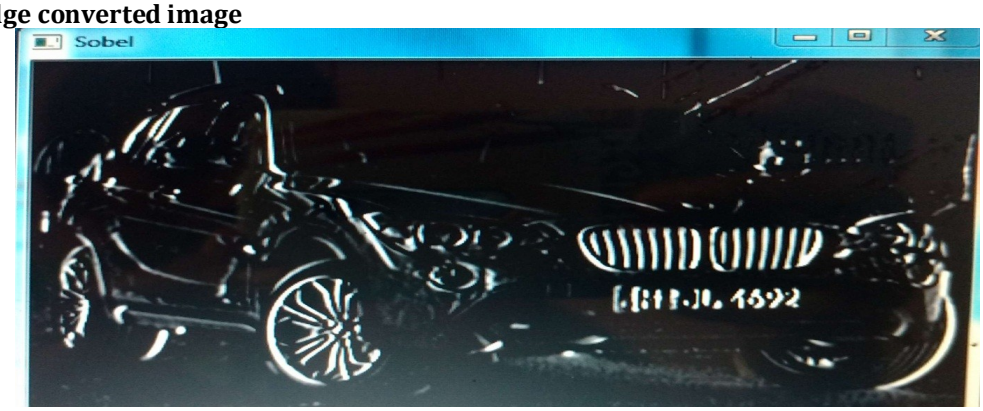

Fig: Sobel edge converted image

4.Threshold image

Fig 8. Threshold image

5.Morphed image:

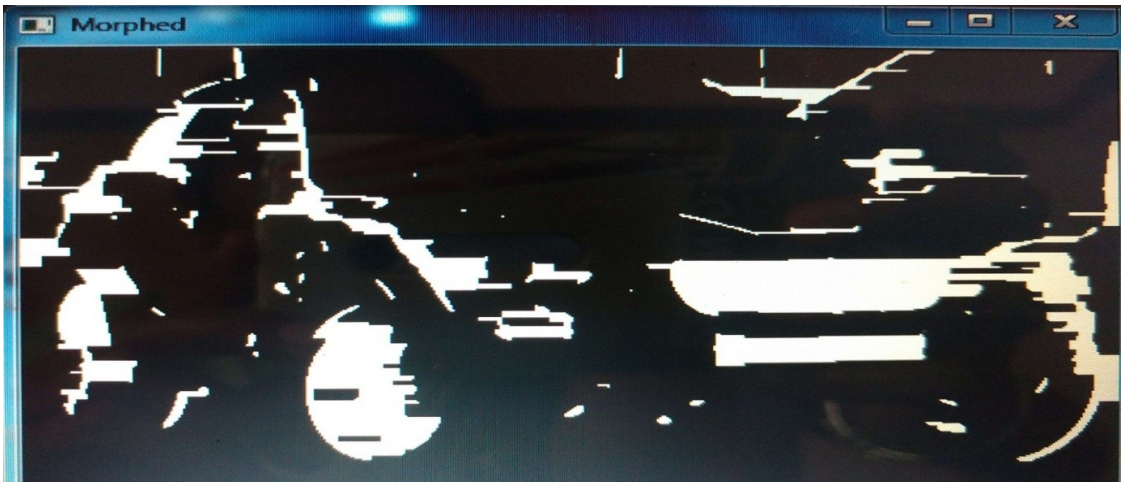

Fig 9. Morphed image

6.Cleaned plate

Fig :Cleaned plate

VI CONCLUSION

An ALPR that spends less processing time, less computing power and has better recognition rates under fewer restrictions was developed using Machine learning and various improved image processing techniques in this study. In the LP region determination stage, to increase system performance, the original image is enhanced by image processing. The rectangular plate is determine based on Morphological operations, Histogram manipulation and Edge detection Techniques for plate localization and characters segmentation. Characters are separated from each other by a vertical projection method on the plate region. The segmented characters are prepared for the character recognition stage by thinning. In the character recognition stage, Artificial Neural Networks are used for character classification and recognition. From all these methods it became possible to detect the characters in vehicle license plate number to a greater precision compared to other character recognition algorithm.

The proposed machine learning techniques for character recognition was captured video and uploads the same to the database. As machine learning was used to get fast recognition, this work also serves as proof of concepts in character recognition domain. The work proposed is specially targeting the vehicles number plates recorded at a place and has varied uses like capturing traffic violations, wrong parking, vehicle identification at the scene of crime etc

References:

1. Serkan Ozbay and Ergun Ercelebi, “Automatic Vehicle Identification by Plate Recognition”, Serkan Ozbay, and Ergun Ercelebi,” “,World Academy of Science, Engineering and Technology 9 2005
2. Ibrahiem M. M. El Emary, " On the Application of Artificial Neural Networks in Analyzing and Classifying the Human Chromosomes” Journal of Computer Science, ISSN 1549-3636, 2006.
3. N. Senthilkumaran and R. Rajesh,” Edge Detection Techniques for Image Segmentation “, International Journal of Recent Trends in Engineering, Vol. 1, No. 2, May 2009.
4. Mohamed El-Adawi, HeshamAbd el MoneimKeshk, Mona Mahmoud Haragi Title: Automatic License Plate Recognition

5. Kuo-Ming Hung and Ching-Tang Hsieh," A Real-Time Mobile Vehicle License Plate Detection and Recognition", Joint Conferences on Pervasive Computing (JCPC), 2009
6. M. M. Shidore, S. P. Narote," Number Plate Recognition for Indian Vehicles ", IJCSNS International Journal of Computer Science and Network Security, VOL.11 No.2, Feb. 2011
7. SaqibRasheed, AsadNaeem and Omer Ishaq," Automated Number Plate Recognition using hough lines and template matching ",Proceedings of the World Congress on Engineering and Computer Science 2012 Vol I WCECS 2012, October 24-26, 2012, San Francisco, USA
8. Raseena A, Asst. Prof. Muhammad sajeer," Automatic Skew Detection and Localisation of Vehicle License Plate Using Hough Transform ",International Journal of Scientific & Engineering Research, Volume 4, Issue 8, August 2013 ISSN 2229-5518
9. Najeem Owamoyo, A. AlabaFadele, AbimbolaAbudu, "Nigerian Vehicle License Plate Recognition System using Artificial Neural Network ",International Journal of Advanced Research in Computer and Communication Engineering Vol. 4, Issue 11, November 2015