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Automatic License Plate Recognition System using Web Technologies and Image Processing for Real Time Retrieval of Information

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Abstract— License Plate Recognition is an efficient manner for automatic vehicle detection, also it is most exciting and difficult research area from past couple of years, which plays important role around this engaged world, due to the grow in vehicles daily. Stealth of vehicles, collapsing traffic rules etc. are increasing linearly, thus we are proposing Automatic License Plate Recognition (ALPR) system for actual time retrieval of information using web technology and image processing techniques, which sends alert to user regarding total fine, if user breaks any traffic rules. In this paper Number plate can be identified using vision APIs and VRS APIs that we have created using Angular JS and PHP Scripting languages. This can be helps to reduces accidents which will most probably happen on traffic signal, this system tracks history of vehicle and ownership transfer, also useful in fine calculation. In upcoming days suppose govt. applies this system in India then complete transport system comes under govt. sector.

Keywords— License Plate, Segmentation, Character Recognition, VRS System, Web Application

I. INTRODUCTION

Generally, government deploys number of work forces to implement traffic rules. It is not always possible to implement it efficiently. It requires time and more work forces. Government has registration of each vehicle with them. They have vehicle database with this basic information such as Vehicle Registration Number, Chassis Number, Vehicle Class i.e. MCYL MOTOR CYCLE, Registration City, Registration State, Registration Name. There are various ANPR systems available today. These organizations are based on different algorithms and methodologies but still it is really difficult job as some of the elements like top speed of vehicle, license plates are different shape and size and also have different colour, words of vehicle number and different illumination conditions can affect very much in the overall identification rate. Using VRS System, we can have direct access to all these information using restful APIs. Once image is given as input to the VRS system, it will carry out series of image processing algorithms on that image. We have vehicle registration system portal which can be handled using android

application. In each chowk, we already have CCTV deployed which is capturing images at frequent interval of time. So during the red signal we will be capturing images. We can read each number plate and following operations we can do using captured number plate

1. Analysing Registration State
2. Vehicle Registration Number
3. Chassis Number
4. Vehicle Class
5. Registration City
6. Registration State
7. Registration Name
8. Driving License of vehicle owner

Complaint of fine will be automatically calculated for each vehicle and it is linked with the vehicle. Owner can also receive reminder to pay fine using registered phone number or it can be tracked using the web portal.

II. RELATED WORK

Priyanka Prabhakar Proposed Automatic Number Plate Detection and Recognition (ANPDR) [1]. Her paper gives a strong technique for localization, segmentation and identification of the characters within the located plate. Images from still cameras or videos are obtained and regenerated in to gray scale images. Hough lines are decided using Hough transform and by detecting edges for smoothing image, the segmentation of grey scale image generated then smooth image is applied to cut back the amount or quantity of connected part and then connected part is estimated. Eventually, single character within the registration code is discovered. The aim is to suggest that the designed technique reached high accuracy by optimizing many arguments that has higher recognition rate than the common ways. The method proposed uses Hough transform and horizontal projection profile each of that have economical and fast hardware implementation, to not solely extract the number plate however additionally simultaneously segment out the parts. Thus reducing computation overhead further as introducing parallelism into the design makes it longer economical and time efficient.

Hanit Karwal [2] proposed Vehicle Number Plate Detection System for Indian Vehicles (VNPD). An exponential growth in number of vehicles demands the use of automatic systems to assert vehicle information. The data is extremely demanded for both direction of traffic as well as decrease of crime. License plate recognition is an efficient way for automatic vehicle identification. Some of the present algorithms based on the principle of discovering takes a lot of time and expertness before delivering acceptable results but still lacks in accuracy. In the proposed algorithm an efficient method for recognition for Indian vehicle number plates has been devised. The algorithm aims at dealing with the problems of scaling and identification of place of characters. Paper introduces VNPD System algorithm based on template matching. This algorithm used changed Otsu's method for threshold partitioning. Scale variations between the characters were cut down by increasing the correlation between the templates. An algorithm is aimed to deal with scale variations by using template matching with Normalized Cross Correlation.

Riazul Islam [3] proposed Automatic Number Plate Recognition (ANPR) is a form of image processing technology for distinguishing the vehicle number plate. This system also extends users to place mark out and monitor travelling vehicles automatically by taking out their number plates. It also meets an crucial role in smart traffic control system. This research gives a easy method to identify vehicle number plates. The projected technique is built on morphological procedures based on different structuring elements in order to supremely omit non concerned region and amend object area. This system has been skilled using a database of number plates and simulated results establish major betterment as compared to other formal systems.

This paper introduces an effective and first computing technique for identifying vehicle license plate. In this technique, moderate numbers of computations are employed in the algorithm. So it is computationally highly inexpensive as compared with mostly conventional methods. The intended system is capable to recognize any type of license plate within a fractionally (Less than 0.5 sec). It is also able to distinguish the characters in the plate even if the license plate is oriented up to 45 degrees. The presented technique can be applied in cosmopolitan area, toll booth and any protected parking lot etc.

III. PROPOSED MODULE

In the intended system we have total 5 modules Vehicle registration system i.e. VRS system, Vehicle license plate identification system, Image tool which will pre-process on the image.

Analyser tool with Image processing actions will make image text more readable. OCR API's of Google will be in use to read text out of those images.

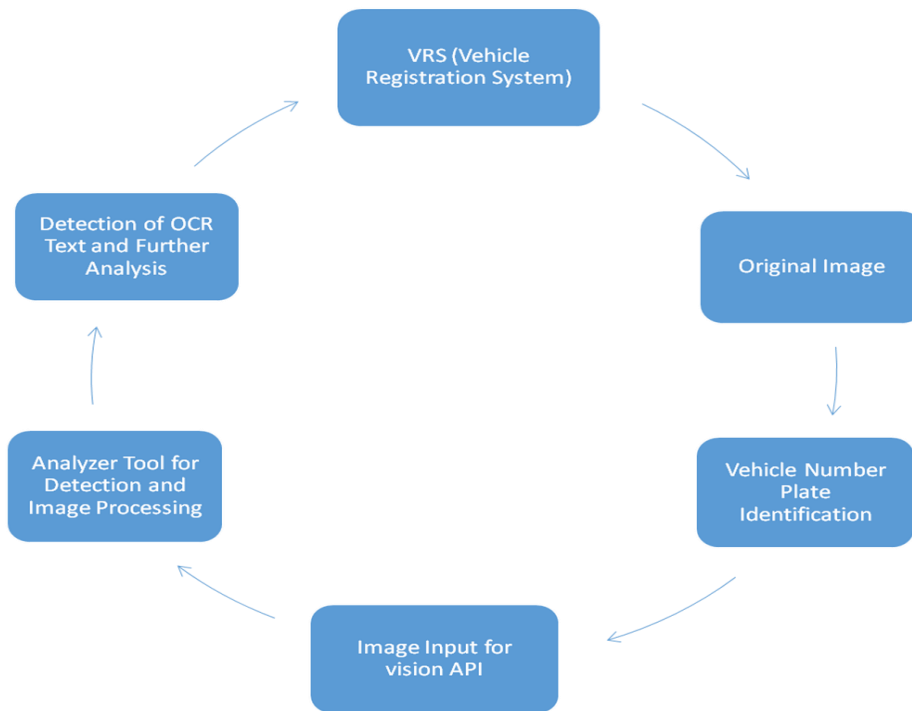


Fig.1 Flow of Proposed Module

IV. IMAGE PROCESSING TECHNIQUES

A. Gray Scaling Image

Human being perceives color via wavelength-sensible sensory cells called cone cell. There are 3 dissimilar types of cones, each with a dissimilar sensibility to electromagnetic radiation (light) of different wavelength. One case of cone is mainly sensible to red light, one to green light, and one to blue light. By uttering a assured combination of these 3 basic colors (red, green and blue), and hence make the 3 types of cones at will, we are capable to yield almost any perceivable color. This is the concluding behind why color images are frequently stored as 3 separate image matrices; one storing the sum of red (R) in each pixel, one the sum of green (G) and one the sum of blue (B). We call such color images as stored in an RGB format.

B. De-noising the Image

Image de-noising is a crucial image processing job, both as a procedure itself, and as a component in other processes. There are many ways to de-noise an image or a fix of data exists. The main attributes of a beneficial image de-noising models are that it will take out noise while maintaining edges. Conventionally, additive models have been used. One mutual approach is to use a Gaussian filter, or equally resolving the heat-equation with the noisy image as input-data, i.e. a linear, 2nd order PDE-model.

C. Contrasting Image

It is the difference in luminance or color that causes an object differentiable. In visual ... the vast changes in light across the day or from place to place. The supreme contrast of an image is the contrast ratio or active range.

D. Compressing Images

It is nothing but a denigrating the size in bytes of a computer graphics file without putting down the quality of the image to an unaccepted level. The simplification in file size permits much images to be stored in a given number of disk or memory space. It also cuts down the time expected for images to be broadcast over the Internet or downloaded from Web pages.

E. Sharpening Images

Distinctness is a combination of 2 factors: resolution and acutance. Resolution is direct and not subjective. It's simply the size, in pixels, of the image file. All other factors equal, the higher the result of the image—the more pixels it has—the more distinct it can be.

Acutance is a slight more complex. It's a subjective amount of the contrast at an edge. There is no unit for acutance—you either intend an edge has contrast or think it doesn't. Edges that have more contrast appear to cause a more defined edge to the human being visual system.

V. METHODS AND TECHNIQUES

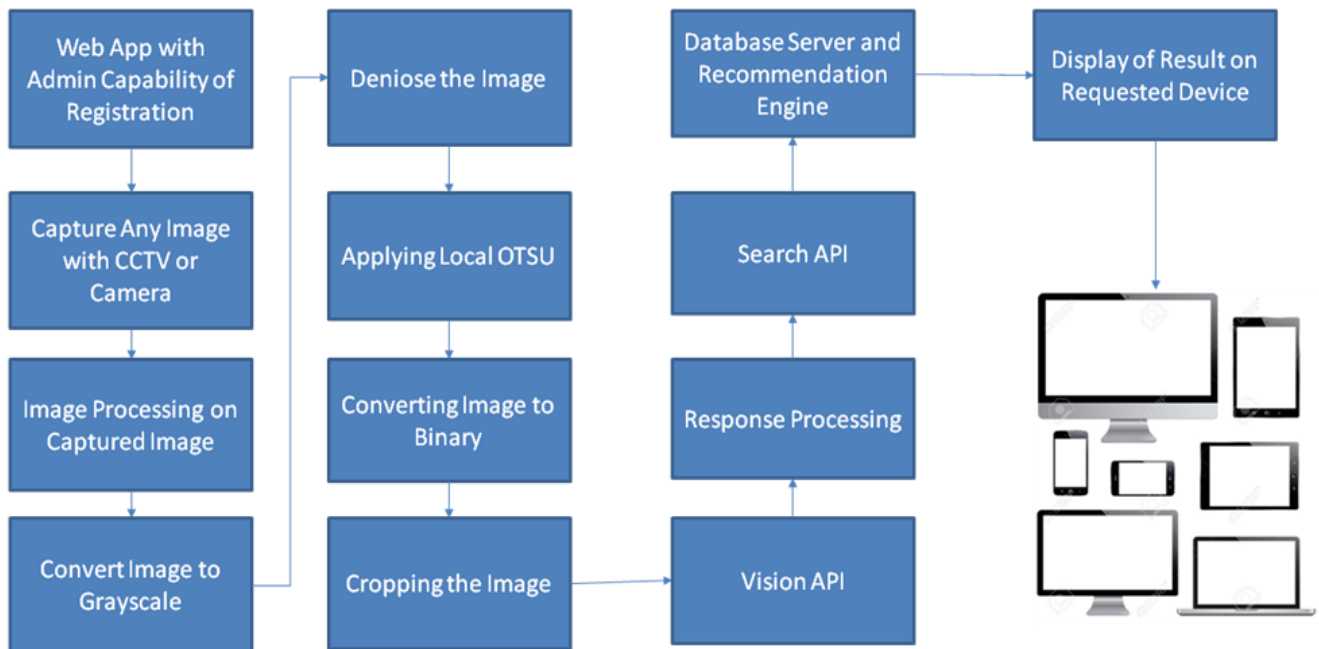
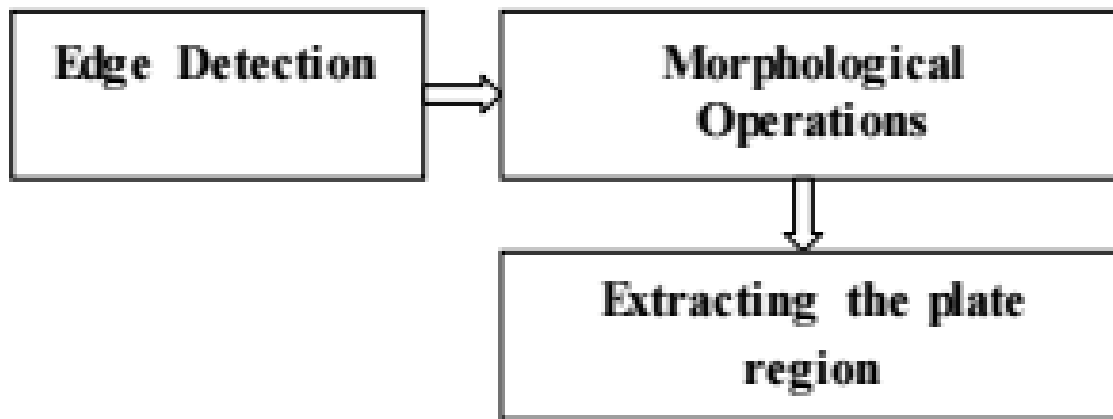


Fig.2 Architecture of ALPR

- *Web App with Admin Capability of Registration:-*
Admin will have authorities whether to give access to others or not. Without admin permissions other person cannot access web page.
- *Capture Image with CCTV or Camera:-*
It captures images for actual time retrieval of information in textual and visual data format.
- *Image Processing on Captured Image:-*
Applying visualize processing techniques like smoothening, contrast stretching, sharpening etc. on captured image.
- *Convert Image to Gray scale:-*
Captured image will be converted into Gray scale to highlight specific range of gray point in an image.
- *Applying Local OTSU Method:-*
This is a thresholding type which is used to automatically perform clumping based image thresholding.
- *Converting Image to Binary:-*
A binary image is an image that has simply 2 valid pixel values. Usually 1(White) and 0(Black) within a bit depth. Like 0 and 255 for 8bit images.
- *Cropping the Image:-*
Only necessary portion of image will be cropped for further process.
- *Database Server and Recommendation Engine:-*
The primary function is to make illations on present data to show relationships amongst objects.
- *Search API:-*
It is applied to search information of registered user by providing keywords. Also it gives information about recent searches.
- *Vision API:-*
It allows for a complete set of capacities including object detection.

A. Localization Technique

Localization technique is applied to distinguish the vehicle plate area from the afforded image. The main objectives of these types of systems are to set the vehicle plate area from the images of the vehicles that are obtained from the camera/video. Character of the image forms an important part of this technique thus treating the image helps in rising the standard. License plates generally seem to possess high distinction areas among the image (black and white or black and yellow). The numbers and letters area unit placed within the same row (i.e. at a standardized vertical level), which in turn results in frequent changes in intensity horizontally. This allows for the premise for finding the changes within the horizontal intensity because the rows that will comprise the license plate are anticipated to show sharp variations. The cause for this sharp variation is that the distinction between the letters and its background. Now the resized binary images are capable to be applied to the Hough transform. Before that for the Hough transform application the images are fed to edge detector for perfect edge detection. Edges facilitate to characterize the boundaries and therefore are tangle of significant importance while process the image.



B. Vision API

It alerts developers to realize the subject matter of an image by encapsulating effective machine learning models in a comfortable to use REST API. It immediately classifies images into thousands of classes, finds independent objects and faces within images and detects and shows printed words held within images. You can form metadata on your image catalogue, control unpleasant content, or enable new marketing assumptions via image sentiment analysis. Examine images uploaded in the petition or incorporate with your image storage on Google Cloud Storage.

C. Segmentation across Detected Image

The next step after doing the detection of the license plate region is segmentation of the plate. It separates an image into its essential parts or objects. The aim of segmentation is to alter the representation of an image into something that is much significant and simpler to analyse. The outcome of image segmentation is a set of sections that collectively cover the total image. It is evidently clear that the partition is one in every of the front most important procedures within the automatic license plate recognition, as a result of all more steps consider it. If the segmentation fails, then a character may be improperly separated into two items or two characters may be improperly unified along. If we tend to accept only single-row plates, the segmentation could be a procedure of detecting horizontal limit between characters. The instant part of the segmentation is an enhancement of segments obtained. The segment phase of a plate comprises besides the character also unwanted parts like dots and stretches further as extra space on the edges of character. There's a necessity to eliminate these parts and extract only the character. Since the sectioned plate is de-skewed, we could segment it by finding spaces in its horizontal projection. We regularly enforce the accommodative thresholding filter to reinforce a locality of the plate before segmentation phase. The adaptive thresholding is applied to differentiate dark foreground from lightweight background with non-uniform illumination.



Fig.3 Segmentation across Detected Image

VI. CONCLUSION AND FUTURE WORK

This paper demonstrates ALPR System which provides Portal for vehicle registration, Portal for vehicle owner to trace the fine and vehicle details, Portal for traffic workforce to upload the images and automate the fine calculation process.

- a. It will include image processing operations and use of vision api
- b. Detection of valid or invalid number plates
- c. Detection of owner and registration city

Also in future this system provides Search tool for vehicle search, Track history of vehicle and ownership transfer, as well as Fine calculation.

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