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Cloud Based Real Time Anti Vehicle Theft By Using LP Recognition And OCR Recognition

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ABSTRACT

A real time Anti-Vehicle theft using LP Recognition in cloud is an image processing technique with cloud computing environment which uses license plate to identify the theft vehicle. The proposed system of this paper is on recognition of LP (License Plate) number and authentication of the license plate number to make human work easier. The main objective of the system is to improve efficient automatic theft vehicle identification system by using the vehicle LP number. It is widely used in various areas such as traffic signals, toll booths and surveillance. The algorithm consists of major parts: Extraction and Segmentation, Template Matching and Authentication, Vehicle identification, The LP characters are recognized and compare with cloud database environment. It helps police and military forces to locate whether license plate number is registered or not and shows owner name and address, place of registration. The system will be going to implemented and simulated in Mat lab, and its performance is testing on a real static and dynamic images.

Keywords: Optical Character Recognition (OCR), Sobel and canny Edge, Template Matching, Vehicle detection, Road Transport Office (RTO).

I. INTRODUCTION

A real time anti vehicle theft by using **license plate** (LP) and OCR recognition in cloud plays a vital role in various real time-life applications. This system is implemented in toll booths, check post and traffic signals to identify the

vehicle theft. The main aim of Anti-vehicle theft using LP recognition in cloud is reducing the vehicle theft throughout the entire country. The reason for implementing this system in cloud environment is the police and military force will easily identify the theft vehicle in other state also because cloud environment is a pooled resource i.e. Cloud computing environment provides a network, including the data storage space, shared pool of resources, specialized corporate and user applications and computer processing power**.**

Automatic license plate Recognition ALPR or as frequently called (LPR) **license plate recognition** is a special form of **optical character recognition** (OCR). License plate recognition (LPR) is a technology that is mainly used for software, which enables computer systems to read automatically the registration number. Transformation of pixels of the digital image into the ASCII character is the automatic reading of the number plate.

The basic steps in ALPR are license plate extraction, license character segmentation, license character recognition. The Image Acquisition and Optical Character Recognition is applied to detect the LP from input image. Sobel Edge is used to separate the characters from extracted license plate. Character recognition is used to recognize the characters from each segmented characters. Template Matching is used to test the characters with Templates.

Special camera is used to avoid motion blur and whether change which can decrease the recognition accuracy dratistically to capture the fast moving vehicle. IR is the best illumination retro-reflective plates which reflect this kind of light very well which is not visible to the human eye vision. It will works on day and night and provides constant good image quality.

II. RELATED WORKS

The Edge Detection methods are used to locate the rectangles from an image [4] [5]. This is very simple and fast technique. Morphology is used to extract the license plate from the original image. It helps to remove unwanted small parts from license plate. In [7] hybrid approach is proposed by combining Edge Statistics and Morphology. The accuracy of finding license plate is 99.6%. In [6] Hough transform is used to find the straight lines in an image. It requires lot of computational time. Images are made up of pixels.

Pixels are connected in the binary license plate of the vehicle and then it is analyzed and make similar sizes are considered as candidates for license plate region. In Adaptive binarization is used to convert the intensity from evening to noon. In fixed backgroundcolor is used and it reduces the edge points and removes the fake regions. In [1] Optical Character Recognition is technique in image processing. It is used to classify/ scan alphanumeric text into computer – readable text to recognize the license plate. It requires preprocessing stage to remove the boundaries which helps in recognizing the characters. The characters are matched over cloud computing environment.

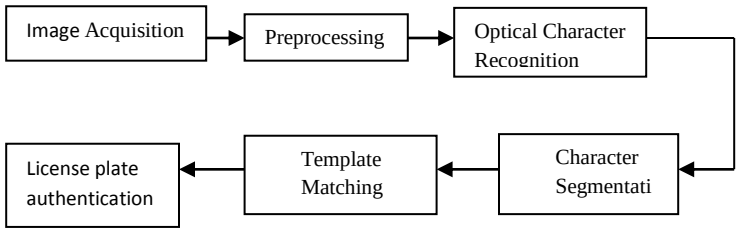


Fig. 1 Steps for the License Plate Recognition

The proposed methodology consists of two main stages:

1. Extraction and Segmentation

2. Template Matching and Authentication

Stage 1 consists of Extraction and Segmentation of images. Extraction locates the area of license plate from an image. Segmentation segments the each character from the license plate.

Detailed explanations of the stages are as below:

- Image Acquisition

The license plate has background of yellow color. So it is required to find the regions in the

image which containthe intensity of three index i.e. R (Red) G (Green) B (Blue) corresponding to the yellow color. Then nearestvalues of the arena is calculated, considering arena as black. License plate is binarized on the basis of RGB index.

- Preprocessing

Getting prop of image area and extreme points by tracing the exterior boundaries of objects and find theproperties for each region of objects. Calculate the maximum area where license plate exits by using coordinatebased approach. Filters and morphology is applied to fill the gaps in image.

- Optical Character Recognition

If any RGB image left in cropped image then convert cropped image to grayscale. Based on threshold value grayimage is converted in to binary image. Black pixels are converted in to white pixels and white pixels into blackpixels. Now the text color is white and background color is black.

- Character Segmentation

The characters are segmented in form of blocks by finding maximum area of each block using Sobel edgedetection.Stage 2 consists of Template Matching and Authentication of extracted license plate. Template Matching recognizethe characters from the license plate and verify the license plate. Detailed explanations of the stages are as below

- Template Matching

Database of templates are created of alphanumeric text. Then load the database and compute the correlationbetween template and segmented blocks. If they match resize the letter of size of template. The output will be the number of license plate.

- License Plate Authentication

The number of license plate are matched from database if vehicle number is not found registered the electronic mail is send to the administrator with the image of license plate. The output will be the image of license plate and vehicle and with message license plate is not found.

III. EXISTING SYSTEM

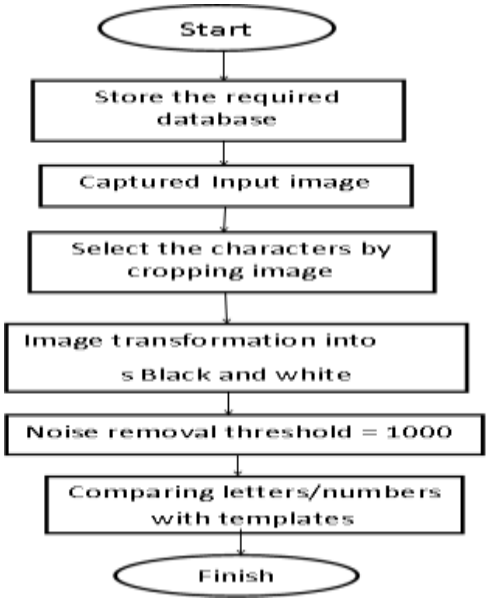


Fig 2: Flow chart

EDGE DETECTION

Edge detection is the name for a set of mathematical methods which aim at identifying points in a digital image at which the image brightness changes sharply or, more formally, has discontinuities. The points at which image brightness changes sharply are typically organized into a set of curved line segments termed *edges*. An edge is a property attached to an individual pixel and is calculated from the image function behavior in a neighborhood of the pixel. It is a vector variable (magnitude of the gradient, direction of an edge)

Purpose of edge detection:

The purpose of detecting sharp changes in image brightness is to capture important events and changes in properties of the world. It can be shown that under rather general assumptions for an image formation model, discontinuities in image brightness are likely to correspond to:

- discontinuities in depth,
- discontinuities in surface orientation,
- changes in material properties and
- Variations in scene illumination.

Edges extracted from non-trivial images are often hampered by *fragmentation*, meaning that the edge curves are not connected, missing edge segments as well as *false edges* not corresponding to interesting phenomena in the image – thus complicating the subsequent task of interpreting the image data.

Edge detection is one of the fundamental steps in image processing, image analysis, image pattern recognition, and computer vision techniques.

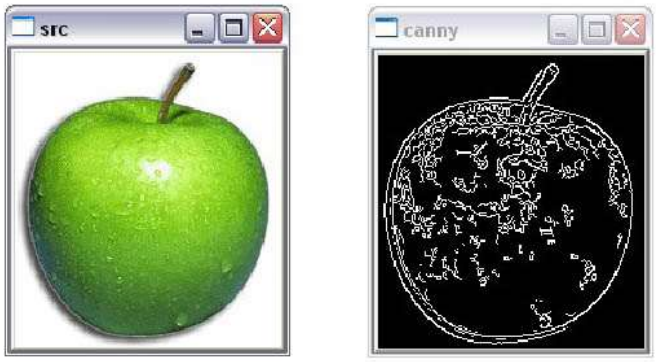


Fig 3: **Canny edge detection applied to a photograph**

Canny edge detection

Edge detection is an essential preprocessing step in many computer vision algorithms. Within this project we implement one of these methods, the Canny Edge Detector.

The Canny edge detector is a popular method for detecting edges that begins by smoothing an image by convolving it with a Gaussian of a given sigma value are show in the (**Fig: 3**). Based on the smoothed image, derivatives in both the x and y direction are computed; these in turn are used to compute the gradient magnitude of the image.

Once the gradient magnitude of the image has been computed, a process called 'non maximum suppression' is performed; in which pixels are suppressed if they do not constitute a local maximum.

The final step in the canny edge detector is the hysteresis operator, in which pixels are marked as either edges, non edges and in-between, this is done based on threshold values. The next step is to consider each of the pixels that are in-between, if they are connected to edge pixels these are marked as edge pixels as well.

The result of this edge detector is a binary image in which the white pixels closely approximate the true edges of the original image.

IMAGE EXTRACTION

When the input data to an algorithm is too large to be processed and it is suspected to be very redundant (e.g. the same measurement in both feet and meters, or the repetitiveness of images presented as pixels), then the input data will be transformed into a reduced representation set of features (also named features vector). Transforming the input data into the set of features is called *feature extraction*. If the features extracted are carefully chosen it is expected that the features set will extract the relevant information from the input data in order to perform the desired task using this reduced representation instead of the full size input.

IMAGE SEGMENTATION:

Image segmentation is the process of partitioning a digital image into multiple segments (sets of pixels, also known as super pixels). The goal of segmentation is to simplify and/or change the representation of an image into something that is more meaningful and easier to analyze. Image segmentation is typically used to locate objects and boundaries (lines, curves, etc.) in images. More precisely, image segmentation is the process of assigning a label to every pixel in an image such that pixels with the same label share certain characteristics.

The result of image segmentation is a set of segments that collectively cover the entire image, or a set of contours extracted from the image can (see **fig 6**). Each of the pixels in a region is similar with respect to some characteristic or computed property, such as color, intensity, or texture. Adjacent regions are significantly different with respect to the same characteristic(s).When applied to a stack of images, typical in medical imaging, the resulting contours after image segmentation can be used to create 3D reconstructions with the help of interpolation algorithms like Marching cubes.

IMAGE RECOGNITION:

Image recognition is the process of identifying and detecting an object or a feature in a digital image or video. This concept is used in many applications like systems for factory automation, toll booth monitoring, and security surveillance. Typical image recognition algorithms include:

- Optical character recognition
- Pattern and gradient matching
- Face recognition
- License plate matching
- Scene change detection

Detecting License Plate Using Texture and Color Information

License plate location, license plate is according to the characteristic, use regular method detection in vehicle license plate location in the image, determining its location and extract. License plate location can use has the following characteristics: (1) the edge features: license plate region contains more than one character, so the edge of wealth; (2): main color feature license plate consists of 4 types: blue, white, yellow and black, white on black, black text on a white background; (3) geometry features: license plate is rectangular in shape, and aspect ratio with a certain proportion; (4) other characteristics: such as license plate frame feature, statistical feature. The current license plate location method is mainly based on the first two features.

Literature [3] proposed a multiple color space to remove most of the background of the integration of rough localization method, and then through the block projection method for precise positioning license plate. But as the license plate color existence diversity, variety of color for the background, coarse positioning effect is small, and the block methods may make the license plate to be truncated.

IV. PROPOSED SYSTEM

A real time anti vehicle theft by using LP and OCR recognition in cloud is to identify the theft vehicle in an efficient way. The theft of vehicle becomes major issue over day to day life in the world. Based on number plate recognition technique theft vehicle can be easily bounded. In this technique the details of each and every vehicle is predefined in the cloud server. Storing and retrieving the data in cloud become easy and secure one for RTO offices use cloud server for storing purpose at the time of vehicle registration. In this system new and secure number plate called High Security Registration Plate (HSRP) is used uniformly all over the country which is implemented partially.

A. HSRP

A **High Security Registration Plate** (HRSP) is a highly secure number plate aimed to bring about a uniform pattern of displaying registration marks across any country in the world. It helps to easily identify the vehicle using camera in the public places and prohibited areas and also helps to reduce the vehicle theft. HSRP plates are made of aluminum featuring unique details apart from the registration number. The license plate have a unique seven-digit laser code, a self-destructive sticker with the engine and chassis numbers of the vehicle, chromium-based chakra hologram to prevent counterfeiting, "IND" inscribed in blue color, with India inscribed at a 45 degree angle in hot stamping foil across all letters and numbers on the plate and it has a non-removable and non-reusable snap lock.

B. Snap lock

The snap lock will attach the number plate in place on the vehicle. Any attempt to remove or replace the snap lock it will cause the lock to break which makes it impossible to install any other number plate on the vehicle. The replacement of HSPR due to any damage can be provided only by the RTO.

C. Laser code

The unique seven-digit laser code is the biggest safety advantage of scanned by laser detector cameras to determine if the number plate details match the laser code and whether or not the registration plate belongs to the vehicle. So the laser detector camera will have to be installed on roads. These types of cameras are not present in India so

far and will have to be imported. The cameras are installed on fixed positions or used as hand-held device that cameras also do the recording details of speeding vehicles while moving.

V. SYSTEM DESIGN

The process can be started by activating the camera in the correct position. In (**Fig 4)** shows that the camera used here is the laser code detection camera. It is useful to detect both the number from license plate and laser code in it. It will search for template in database and compare symbol until the camera is active. Once the camera is activated then it searches for vehicle images. After finding the location of the license plate the located region is extracted using extraction method. The extracted plate is in image format, and then the number from that image is extracted using optical character recognition method. Now the character is sent to the cloud environment through internet. In cloud environment the database about each and every vehicle is stored and also the complaints registered about any vehicle are stored in cloud database. First compare a number with the vehicles owner detail database and checks the registration plate is valid or not. If the registration plate is not valid then it sends the alert message to the computer where the validation process is requested. Otherwise it checks for complaints under police station from all over country if it is registered. If complaints under the respective vehicle are found then it sends the alert message to the system from which the request is sent and also mail to the person who registered the complaint. Otherwise the message with vehicle details is sent to the respective system that the vehicle is genuine. The overall process and the transaction are done through the internet.

A. Extraction of image

The captured number plates are cropped using edge detection algorithm. Filtration of the images improves the image resolution and the final image is segmented to extract each number. The standard format of each alpha numeric image is predefined in the database. The extracted image is matched with the database by comparing the matrix value. If the captured image is matched in the database then respected string value is returned.

B. Designing user interface page

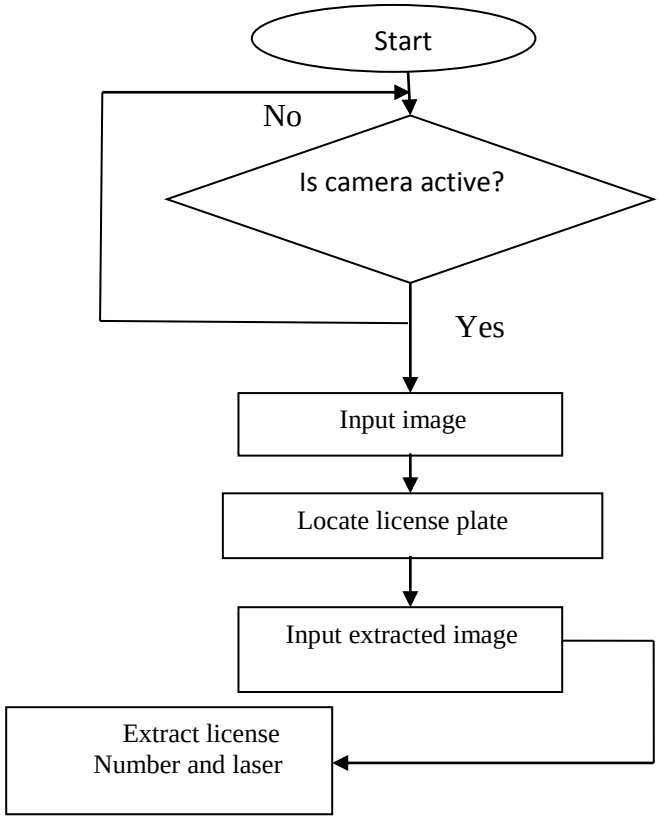
In the designing of user interface page, the login details are provided to the authorized person but not to everyone. After creating the login details, the authorized persons only able to check the updates and match the extracted string with the database to find the status of the vehicle. While matching the returned string value is sent to the cloud database. To find the theft vehicle it is mandatory that the owner should registered a complaint in the police station. If the number matches then the alert message is sent to the respective device from where the request is sent.

C. Testing the application in private cloud

The whole system process is developed and tested under private cloud using Microsoft Windows Azure platform.

D. Implement the application in public cloud

After testing process is successfully finished under private cloud then it can be move on to public cloud for implementation.



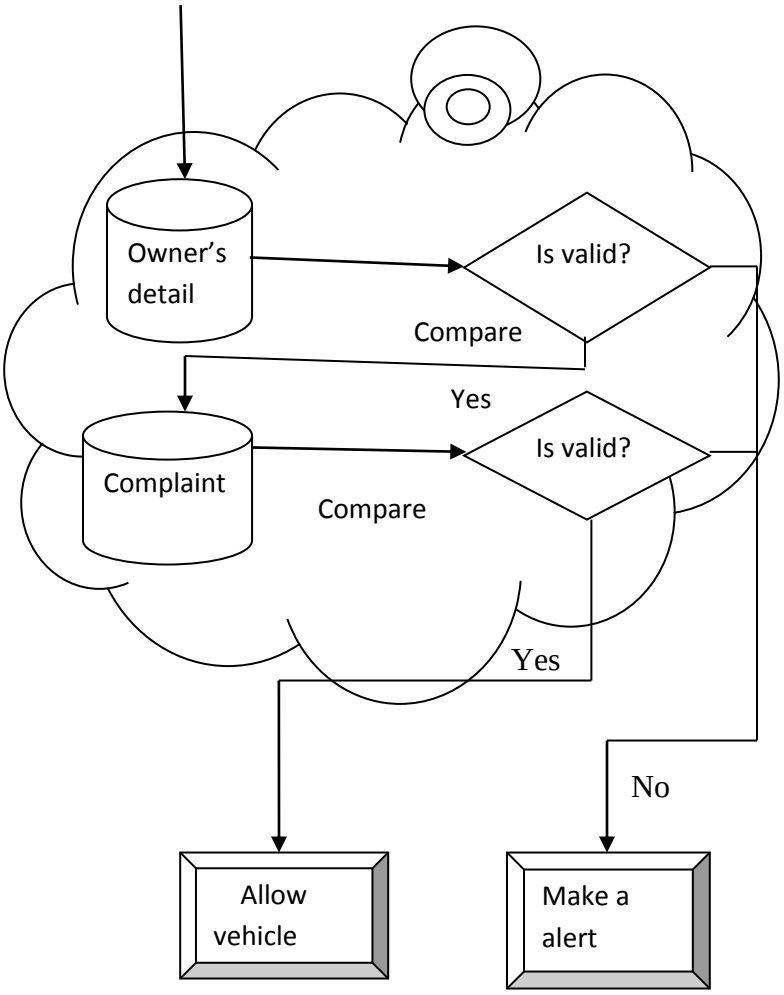


Fig 4: Proposed flow chart

CONCLUSION

A real time Anti-vehicle theft using License plate recognition in cloud is implemented in toll booths and traffic signals to identify the vehicle theft. Nowadays, vehicle LP recognition system has become a key to lots of traffic related applications. Extracting the number from the license plate is one of the most important stages. Anti-vehicle theft using LP recognition in cloud consists of two modules, one for Extraction and Segmentation LP and other for Template Matching and comparing Authentication details in cloud database. Anti-vehicle theft using LP recognition in cloud implements the system to find the unauthorized and theft vehicle in an efficient way and to recover the vehicle.

The proposed system is implemented in toll booths to identify the vehicle. After the successive of this, it can be upgrade and implement in the public places like traffic signal, petrol bunk, and check post and so on. By using this method will reduce the vehicle theft and also culprit will not escape. The number plate recognition technique is tested under MAT lab and the virtual environment is created under the private cloud for testing purpose in Windows Azure. After the completion of testing it can be tested on the public cloud. It is very useful to find the vehicle where it is. If the theft vehicle is caught by the camera then the current information about the vehicle is send to the database it can be seen by police and military force department.

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