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Number Plate Recognition a for Parking Assist and Road Safety

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Abstract:- As an Engineer and an Indian citizen, Parking is a major problem in our country as well in our surroundings such as Apartments, Educational Institutions, etc. and also road Safety. This problem can be autonomously monitored. Automobile parking is a predominant factor within any transit system, whereby automobile are habitually parked at terminuses. With an escalated number of motor vehicles on roads peculiarly in emergent countries, there is a need for an automobile identification mechanism that is operative, affordable, and competent. In most academic institutions, apartments, in addition car parks, the constant car park entry registration process for visitors, faculty or students entering the institution involves a security guard having to authenticate membership particulars by examining for membership sticker on the windscreen of the vehicle or by checking the driver's credentials and identification card. This procedure of inscription is dreary and time-intense and is disposed to to erroneous recordings, also, the backup and distribution of this vehicle information are grim because the information is rigid to duplicate. This procedure can be automated using Image Processing and a dedicated Android Application for owners and Policemen with automatic theft control, Email, and messaging. Road Safety on the supplementary side is also completed using the identical application where the user can fail grievances concerning traffic violations, accidents, women harassments etc., which will be automatically updated in the police application. And he/she can take necessary decisions. Concluding, this proposed project can bring a new revolution in parking assist as well as road and women safety.

Keywords:- *Image Processing, Spyder, Firebase, MySQL, MIT App Inventor, Android Application, Raspberry Pi, Pi Cam/Webcam, Tableau.*

I. INTRODUCTION

Vehicles are very dense in a populous country such as ours. The idea is to create a smart solution to deal with modern problems. As there are many vehicles the government needs to monitor these vehicles for various parameters. It is nearly impossible to man the streets to catch up with the violators. So here we bring up our research on Image Processing of Number Plates, here using the image processing technology we are able to scan the number plates of the vehicles and identify the violators and file infractions on the person. So instead of using separate police officers we use machine learning to lodge complaints on the infatuate.

Parking is an imperative element within any transport structure, whereby automobiles obligated to be parked at every terminus. Most automobiles are parked maximum of the time throughout the day. Parking expediency is the luxury of accessing a benign and desirable parking location, hence distressing the ease of reaching destinations. India which sees itself as a hopeful global influence and an economic pivot can accomplish its goal if and only if a huge amount of women folk participates in the advancement progression. This paper presents an analysis review on the principal need of the intelligence security systems with technology requirements and challenges to build the system. Since the prediction of such an incident is not possible hence to curtail the prospect of physical violence (robbery, sexual assault etc.) by possession of all the help tools ready to securely escape from insurgent situations. This condenses the hazard factor and brings assistance when needed. The social networking is the part of our life and also a source for women harassment by uploading the offensive photograph taken by hidden cameras, even though these cases might happen with innocence males, in some such cases these guys end their life by committing suicide.

Automobile car parks are an imperative element within any conveyance system, whereby automobiles are often parked at destinations. With an increased number of motor vehicles on roads especially in emerging countries, there is a need for a automobile credentials verification mechanism that is operative, inexpensive, and competent. In most academic institutions, apartments, and automobile parks, the constant car park entry record-keeping process for guests, faculty or students entering the institution involves a security guard having to confirm membership credentials by checking for affiliation marker on the windscreen of the vehicle or by checking the driver's credentials card. This process of writing is dreary and stint-consuming and is prone to erroneous recordings, furthermore, the backup and distribution of this vehicle information are grim because the figures are hard to duplicate.

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II. PROGRAMMED NUMBER PLATE DETECTION

Programmed Number Plate Recognition is a method where the automobiles are branded or recognized using their number plate or license plate. PNPR uses image processing procedures so as to the vehicle number plate from alphanumeric images. PNPR systems normally comprise of two components: A 5mp camera with infrared and night vision is used in capturing of vehicle number plate images, and software that extracts the number plates from the captured images by using a character recognition tool that allows for pixels to be translated into numerical readable characters. A license plate recognition system generally works in four main parts namely image acquisition, license plate detection, character segmentation, and lastly character recognition. It is a sequential process where first the original RGB image gets captured then the image gets converted into grayscale that is, it gets binarized. Then the image is filtered of noise and such similar undesired components. After the image is filtered the license plate image is specifically cropped out from the main image. After magnifying and selecting the image it then gets read by character segmentation that is done using open cv software where the image is considered and a separate layout is taken where the image gets segmented structure by structure until the whole segment is due processed.

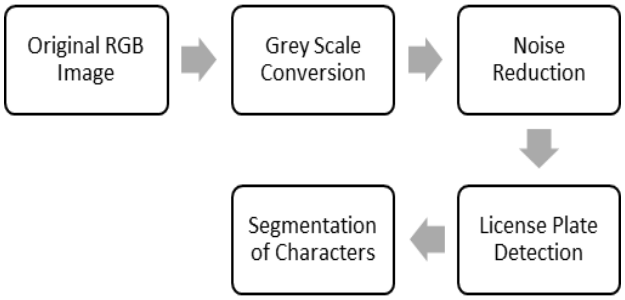

Fig 1:- shows a typical PNPR process.

A. Image Acquisition

The first step is the image acquisition phase. The image of the vehicle is apprehended using a photographic camera. The constraint is that the image of the vehicle should be taken in such a mode that the selected input image comprehends the rear or front view of the vehicle with the number plate. This procedure can also be done by capturing a video and absconding the image frame by frame to obtain the image. So by fixing suitable cameras at proper terminuses we are definitely able to apprehend any said image through video processing. The image is usually captured in an RGB (Red, Green, and Blue) color model. The captured image is affected by many factors like photosensitive system, distortion, system noise, deficiency of exposure, or extreme relative motion of camera or the automobile thus resulting in a dilapidation of a captured vehicle image hence unfavorably affecting the outcomes of the inclusive image processing. As a modification mechanism, an image pre-processing stage is familiarized to take care of any blunders that may have occurred during the image acquisition stage. Image pre-processing mainly involves translating the RGB image into grey color, noise removal, and border enhancement for brightness. Image pre-processing is usually done through image filtering.

image = cv2.imread('C:/Users/N/Desktop/Test.jpg')

B. Grey Scale Conversion

In the 1st step we obtain the saved image from the camera image or an image from local files. Greyscale image is preferred because it displays the required part clearly without deflecting any minor unnecessary itinerary. Grey scaling an image is important because it surely does make the processing system easy to read the image and follow further instructions easily without any difficult hurdles that trouble the processor in processing. Next we convert the image into a grayscale image using Open-CV, a python-based image processing library file.

cv2.imshow('Gray image', gray)

C. Filtering of Image(blur)

A bilateral filter is used for smoothening images and reducing noise, while preserving edges. It is easy to note that all these denoising filters smudge the edges, while Bilateral Filtering retains them. Image blurring is achieved by convolving the image with a low-pass filter kernel. It is useful for removing noise. These noises tend to infect the image with interference which may lead to erroneous readings. It removes high-frequency content (e.g: noise, edges) from the image resulting in edges being blurred when this is filter is applied.

Blur = cv2.bilateral(gray,11,90,90)

D. Canny Edge Detection

Canny Edge Detection is a popular edge detection algorithm. It was developed by John F. Canny in 1986. It is a multi-stage algorithm. OpenCV puts all the above in a single function, **cv2.Canny()**. We will see how to use it. The first argument is our input image. The second and third arguments are our *minimal* and *maximal* values respectively.

Edges = cv2.canny(blur,30,200)

E. Contouring

Contours can be explained simply as a curve joining all the constant points (along the boundary), having the matching color or intensity. The contours are a beneficial tool for shape breakdown and object detection and recognition. For better accuracy, practice binary images. Contour basically just crops out the essential part from the unabridged image. It has turned out to be very valuable because it unbiased traces along the boundaries and legibly provides very accurate outcomes. So before finding contours, apply threshold or canny edge detection. find Contours function modifies the source image. So, if you want source image even after finding contours, already store it to some supplementary variables. In OpenCV, finding contours is like finding white objects from a black

background. So, remember, the object to be found should be white and the background should be black.

```
cnts, new = cv2.findContours(edges.copy(), cv2.RETR_
LIST, cv2.CHAIN_APPROX_SIMPLE)
```

F. Number plate cropping

It is also called arc length. It can be found out using **cv2.arcLength()** function. Second argument specify whether shape is a closed contour (if passed True), or just a curve.

```
plate = None
for c in cnts:
perimeter = cv2.arcLength(c, True)
edges_count = cv2.approxPolyDP(c, 0.02 * perimeter, T
rue)
if len(edges_count) == 4:
x,y,w,h = cv2.boundingRect(c)
plate = image[y:y+h, x:x+w]
break
cv2.imwrite("plate.png", plate)
```

The above code crops only the number plate in the image processed as saves the copped image as plate.png

G. Character Segmentation

Python-tesseract is an optical character recognition (OCR) instrument for python. That is, it will distinguish and "read" the text entrenched in images. Python-tesseract is a wrapper for Google's Tesseract-OCR Engine. It is also useful as a stand-alone supplication script to tesseract, as it can read the entirety of 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 as an alternative of writing it to a file.

```
import pytesseract
text = pytesseract.image_to_string(plate, lang="eng")
print(text)
```

The above code uses pytesseract package to convert image file to string file automatically.

III. PARKING ASSIST

Each and every number plate is processed using image processing in Spyder (Python) or MATLAB. Every car has its own parking lot in an area. Our project helps the drivers, as well as the security, correctly park in the respective place. While the car enters the parking lot, the car number is obtained. This car number is correlated and compared in the database and finds the correct parking lot number. The parking lot number is delivered to the driver and he can park in a specific lot. Even though, if the driver parks in the wrong lot, it intimates the driver as well the security by a notification. Car in time and out time, Car number is uploaded to the database and is also intimated i.e. notified to the owner through a web app and android application. Automatic Bill is generated using in time and out the time of the car.

Parking lots in a specific venue can be pre-booked using the Web Application. If there is any malpractice done by the driver, police accounts are also integrated with the web app, so that theft and other cases can be filled and FIR (if the case is serious) can also be obtained as a PDF in the Web Application itself. The output from Python is updated to My SQL database using Python. PHP is used to retrieve data from SQL Database and view it in a Web Application. This Web Application will be able to send E-Mail, Message, Notification to the owner as well as a nearby police station in a case of emergency. The owner can him/her self-update the GPS location, lot number, and in time & out time in her App, pre-book parking lots as at times people won't be using Drivers. A web application will be provided to the drivers, to update the parking lot number, in & out time, GPS location, and other information are to the owner. Furthermore, Tableau can be used to visualize the data sets in the server directly in the software using graphs, time logs, time periods, payment, etc.

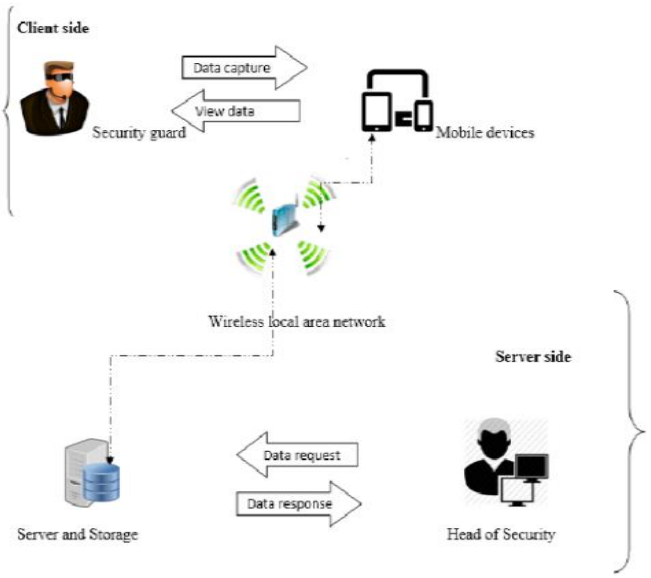

Fig 2:- Women Safety System

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IV. WOMEN AND ROAD SAFETY

This Web Application is not only used for Parking Assist, It can also be used in the case of Road Accident, Traffic violations, etc. The user can enter the Car Number with the GPS location and the fault they did including the locality. Then the police officials can do the necessary. When a woman is being harassed or being followed by a stranger who is doubtable by the women, she can send the GPS information, SMS to nearby police stations and relatives by a press of a button. This also helps women in a needy and most followed issue, the application is able to display the details and location of all major vehicle repair shop in a locality with best customer reviews and women-friendly ones in case of vehicle breakdown and it is also coded to notify the selected contacts when in the case of vehicle breakdown so that they can know their current location and also track the progress of them repairing the malfunction. This ensures the maximum safety of women when struck in any kind of remote areas where their safety is at peril. It basically works like a security application for women can select emergency contacts from their contact list and save them who when they're in need of assistance they can simply just at the press of a button call for help.

An application is developed to lodge complaints about missing vehicles and we also provide a follow up with police and the user is able to see the status of the lodged complaint through this app. With the help of this application the person who lodges the complaint need not have the use to often go to the police station and check up on his complaint, they can simply use the application.

V. RESULTS

Fig 3:- grey scaled image

Fig 4:- Blurred image

Fig 5:- Edge image

Fig 6:- contour image

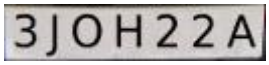

Fig 7:- Final cropped image after character segmentation

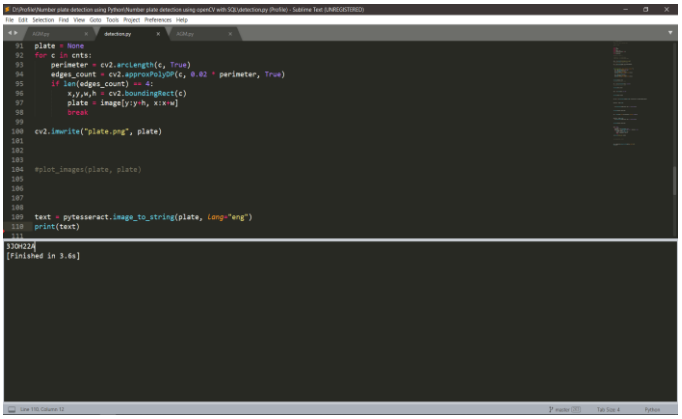
Fig 8:- Final output in Spyder IDE

VI. CONCLUSION

Problems and challenges associated with car park vehicle identification details formed the basis for this research. The main aim of this research was to develop an automatic number plate recognition system for car park management, using Optic Character Reader (OCR) on a mobile device. The OCR process forms the basis of the entire system that was proposed by the researcher as a means of tackling the challenges faced by the security guards during the vehicle entry registration process. The completion of the proposed system resulted in the following benefits:

- Elimination of the hard copy occurrence book and the need to have to physically write onto the book, because all the vehicle details records will be digitized.

- Hastening of the car park vehicle identification process including the entry and exit process, thus shortening the time duration.
- Accurate recording of vehicle information.
- Provides a means of easy information sharing and International Journal of Computer Applications (0975 – 8887) Volume 175 – No.7, October 2017 42 information backup.
- Real time information sharing of the vehicles entering and exiting the Institution to the Head of Security.
- Easier analysis of the vehicle information captured.

The process what generally occurs here is that first the image gets captured. Then nominally the image is converted into grayscale. After the grayscale conversion we need to filter the image of blurs and another synchronicity error in the image by processing it. Then the image gets cropped only selecting the number plate, this process is specifically done to obtain precise and correct results. The process for cropping the image must be very carefully coded because the software shouldn't erroneously select any other number present in the image. After the image is cropped and correctly obtained, we need to detect the image and send it for processing further operations. The cropped image simply doesn't cope, first the image gets segmented through character segmentation so the optical character gets segmented. We basically make the machine learn to detect what alpha numeric character is directed and displayed in the processed image. By doing so we can automate the entire process so even a simpleton like a layman just like that is able to perform these tasks by the press of a switch or button.

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