Detection of Vehicle Intrusion Using Opencv

Ch.Sekhar, K Venkata Rao

Abstract: Detection of vehicle Intrusion may be a period of time embedded system that mechanically acknowledges the registration number plate of vehicles by victimization Optical Character Recognition. it's the potential of characteristic the unauthorized vehicles that trespass in dark areas. Several applications square measure starting from complicated security systems to common areas and from parking admission to urban traffic control[1]l. Detection of auto Intrusion (DVI) has complicated characteristics thanks to various effects like light-weight and speed. Most of the registration code Recognition systems square measure designed victimisation proprietary tools like MATLAB. during this paper, another methodology of we tend to enforced this technique victimisation Python and therefore the Open laptop Vision Library. This System can be implemented over offline video as well as on a live streaming video. Whenever a vehicle enters the zone, using OCR, the License Plate is recognized and verified over the database of allowed vehicles. If an Intruded vehicle enters a restricted area a message over a mail will be triggered to the zone in charge with the details of the intruding vehicle and the time instance of the vehicle entering the zone. These details are also stored in the database.

Index Terms:Vehicle Intrusion, Intrusion Detection, OpenCV

I. INTRODUCTION

Vehicle Intrusion Detection is a software application that monitors a place or an area for malicious activity or access violations. VID is designed to provide human less security which can alert the security services by triggering an alarm when a malicious activity takes place. The primary purpose of this paper is to reduce the human effort by taking advantage of computer vision and high-speed computers. It is also a fact that humans are prone to make mistakes and on the other hand it is essential to automate the manual tasks to computers. The system is simple and easy to use. It takes minimum efforts and cost to install anywhere. It can be used 24x7 and also we can ensure 0 errors once installed. It has a built-in security system which can automatically capture the intrusions and can alert the security services through an email within a span of seconds.

A. Purpose:

VID is relatively a new innovation in security. It is essential to improve our security systems continuously. VID system is designed in situations where the security surveillance is heavily needed and in situations like where traditional manual security check-ups become slow and dull. VID completely avoids the humans and function on fully automatic mode. It can troubleshoot its own problem and they can recover to normal mode when a sudden crash in the software happens. VID has a lot of scope in future. It can be deployed to the areas where security is most important to the locality like military bases, nuclear sectors, defence secured areas, etc.., It can also be deployed to small scale areas with the minimum cost factor.

B. Motivation:

The traditional security system might become outdated in upcoming years. Those manual techniques may not function well and also we cannot ensure the perfect security to the locality. Innovation is needed to overcome this deficit.

C. Literature

Intrusion Detection System (IDS) is a vital component of security measures shielding computer systems and networks from potential abuse and misuse. In 1980, John Anderson published one of the earliest papers on IDS in the Computer Security Threat Monitoring and Surveillance. Since then many different efficient approaches for IDS have been proposed and implemented in practice. However, the research on intrusion detection is still an active field and attracts the attention of many researchers because of its challenges and necessity of IDS for our computing resources when using the Internet. Some of the challenges in current IDS are:

Effectiveness: IDS should detect attacks accurately without raising too many false alarms. It can be fine-tuned to produce less range of false alarms however solely at the price of the accumulated range of false negatives (i.e., by missing the particular attacks); conversely, it are often created general to hide a lot of attacks however solely at the price of the accumulated range of false alarms. Additionally, the potency of associate intrusion detection system conjointly contributes to crucial its effectiveness.

Adaptability: IDS ought to unendingly learn changes in the earth after some time and acclimate to them in like manner. Adaptability is a noteworthy test and apparently the most wanted trademark for IDS. For the most part, accomplishing flexibility consequently is a more complicated issue for abuse recognition frameworks which depend on a manual making of marks. Oddity location frameworks by definition search for novel assaults yet they likewise need to adjust their scholarly models of typical conduct with respect to changes in the earth

Speed: dealing with the high-performance network — Diversity of environments: needs to operate in changing and adversarial network environments with different protocols, services, and applications.

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Fault tolerance: the IDS not becoming security vulnerability itself. — Inter-Operability and transparency Ease of use.

Timeliness: handle large amounts of data. Concerned with how quickly the IDS can propagate the information through the network to react to potential intrusions. It is also referred to as scalability [3].

II. PROBLEM DEFINITION

A. Definition

Vehicle intrusion detection is a Computer Vision technique which is able to recognize a license plate number of the vehicle and make sure that the vehicle is authorized or not. If the vehicle is authorized then it allows the vehicle to proceed further otherwise it sends an email to the administrator with the details of the vehicle. This framework is helpful in numerous fields likes parking areas, private and open doors, burglary control. In this paper, we structured such a framework. Initially, we catch the picture from the camera at that point load into the framework after that we utilized OpenCV library tools[2]. At that point we make the preparation set of various characters of various sizes. Based on this preparation set, we separated the character from pictures. At the point when the tag is distinguished, its digits are perceived and checks whether the acquired digits are in the database are not. If they exist in the database then it allows the vehicle otherwise sends an email to the administrator. In this mainly focuses on Neural Network and proprietary tools OpenCV in which ALPR systems were implementing using Free Software Open Computer Vision Library including Java.

Existing System

Nowadays with the increased vehicle moment on the roads, handling of the traffic rules manually is a very tedious task to the smooth running of vehicle moment without any troubling. National High way roads are set up with Toll plazas on the way, where the vehicle has to stop to clear the road charges. Managing the traffic system are constructed on freeways to identifying the vehicles speed moments whether vehicles are moving with desired speed or over speed as per the law on the respective location. Now the question arises that how to identify the particular vehicle? The simple answer to this question is the vehicle number plate. The number plate is only unique identification to differentiate the one with another vehicle, which is successful particularly when both are of a similar sort of make and model. A robotized framework can be created to discover the tag of a vehicle and perceive the characters from the area having a tag. The vehicle tag number which can be used to bring more remote data information about the vehicle and its proprietor, which can be utilized for further handling.

B. Existing System

The Existing system presents a number of shortcomings that makes it ineffective.
This includes;
- Storage of the records is problematic principally because of the amount of knowledge
- Report generation is sophisticated and inaccurate since some files get misplaced.

- The system uses too several papers to take care of the records
- The system is obstruction
- Data isn't born-again simply to the knowledge
- The readiness of the data.
- Data handling could be a drawback

III. METHODOLOGY

In India, basically there are two kinds of license plates, black characters in the white plate and black characters in the yellow plate. The process of the proposed system consists of the below steps:

1. Capture: The given image of the vehicle is captured by the camera which is high-resolution quality. We save the below image in the system.

2. Pre-processing: Pre-preparing is the system in which foundation light conditions and the number plate limitation calculations are utilized. In this stage primarily centers around lessen foundation clamor, improving complexity. The framework preprocessing utilizes two procedures: Resize – In this area we need to change the span of the article as per prerequisite. Convert Color Space – Images caught by cameras will be either in crude configuration or encoded into some interactive media principles. These pictures will be in RGB mode essentially for example red, green and blue. There ought to utilize OpenCV work in pre-preparing s

3. Number Plate Localization The number plate localization is the phase in which mainly focuses on ROI (Region of Interest) where we find the contour region.
- Contour Tracing: Contours can be explained simply as a curve joining all the consecutive points (along the boundary), having the same color or intensity. The contours are a useful tool for shape analysis and object detection and recognition. Here we use contours in rectangle shape[2].
- For better accuracy, use binary images. So before finding contours, apply a threshold.
    - In OpenCV, finding contours is like finding a white object from a black background

Fig 1a) Captured Image.

Fig 1b) Localization (Threshold image)

4. Character segmentation
   Character division is the method in which the unique characteristics present in the picture is isolated out. Here all character is looked at independently.
5. Character Recognition
   A programmed license plate recognition framework must perceive alphanumeric characters. . The character picture is contrasted and the preparation set and the best similitude is estimated and as indicated by this perceived character is s
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IV. IMPLEMENTATION

The Initial phase of usage comprises rendering the video and produces the edges that are created by video. At that point, the edges are pre-processed by applying a set of techniques to improve the quality. The following stage that pursues is the number plate acknowledgement stage that completes a few capacities, for example, resizing of the picture to an attainable angle proportion. Just as changing over the hued picture into a dim scale, picture. The number plate can be found anyplace inside a picture, and it is unrealistic to check every one of the pixels of the picture to find the number plate. In this manner, we spotlight on those pixels that have the number plate.

At that point in a request for the legitimate content acknowledgement to occur the line of content is first divided, at that point from the fragmented line the words are sectioned and afterwards from that the characters are portioned. At last, Template coordinating, or grid coordinating, is a standout amongst the most well-known arrangement techniques. In format coordinating, singular picture pixels are utilized as highlights. The arrangement is performed by contrasting an information character picture and a lot of layouts from each character class

OpenCV:

Open Source Computer Vision Library is **exclusive code to support the mixture** computer vision and machine learning techniques with an in-built library. OpenCV was engineered to supply a standard infrastructure for computer vision applications and to accelerate the of machine perception in commercial products. The library has more than 2500 optimized algorithms, which incorporates a comprehensive set of each classic and progressive computer vision and machine learning algorithms. These algorithms will be accustomed notice and acknowledge faces, establish objects, classify human actions in videos, track camera movements, track moving objects, etc.

All the OpenCV array structures are converted to-and-from Numpy arrays. So whatever operations you can do in Numpy, you can combine it with OpenCV, which increases the number of weapons in your arsenal [4].

Implementation Steps

- store the data of authenticated users into the database from the workbook
- Capturing the picture of the vehicle as input for the application
- Scan for the rectangular plate in the picture which is the licence plate of the vehicle
- Extract the number from the license plate
- Query the database using the extracted information

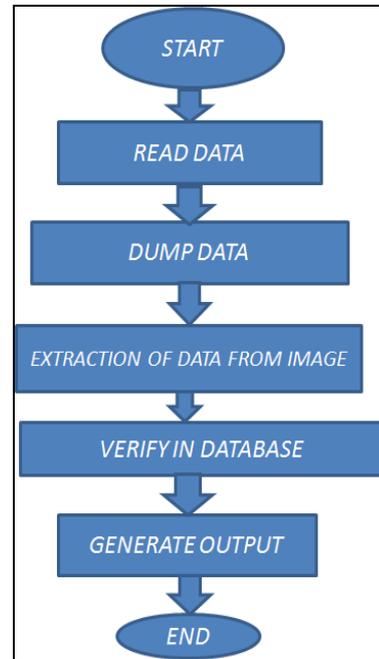In case if a query doesn't return a row we generate a security alert

Fig 2: Proposed Model Implementation Steps

Table 1.Authorized Vehicle Data Set

USER_ID	REG_NO	CAR_MODEL	NAME	PHONE_NO	DEPT_ID
250024	AHA8208	lamborghini	karthik	8247032129	1
250025	MH14EU3498	Audi	ravindra	9393398750	1
250026	AP 31 XS 0003	Benz	kavva	9393398750	2
250027	AP 31 XS 0004	Benz	dinesh	9393398750	2
250028	AP 31 XS 0005	Xolo	balaii	9393398750	3
250029	AP 31 XS 0006	Tovota	vamsi	9393398750	2
250030	AP 31 XS 0007	Audi	tarun	9393398750	1
250031	AP 31 XS 0008	Tata indica	nihaal	9393398750	3
250032	AP 31 XS 0009	Benz	swarnesh	9393398750	2
250033	AP 31 XS 0010	Tovota	sai	9393398750	1

Registered person id	Vehicle number
11113	AP 15 AL 2729
11114	AP 31 BG 7000
....	....
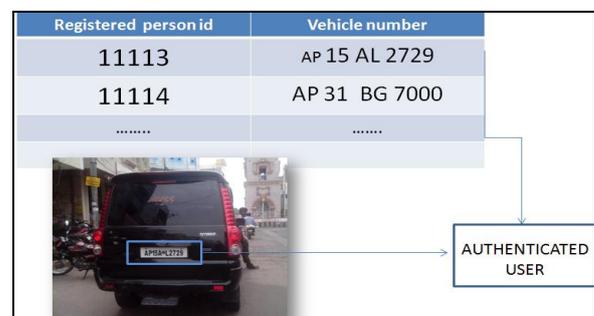
Fig 3 a) Identifying the Authorized vehicles

Fig 3 b) Identifying the Unauthorized vehicles

Future Enhancement: Because of the decent variety of number plate, the procedure of acknowledgement confronted an issue. For the improvement of number plate acknowledgement different creators utilized neural system model, for example, RBF neural system show, BP neural system model and SOM neural system display. In this paper present, the survey of number plate acknowledgement dependent on various neural system demonstrates. The handling of number plate acknowledgement is additionally exceptionally troublesome because of foundation and commotion. Because of the issue of acknowledgement confronted an issue of street security reconnaissance.

V. SUMMARY

Vehicle Intrusion Detection plays a vital role in numerous real-life applications, such as automatic toll collection, traffic law enforcement, parking lot access control, and road traffic monitoring. VID recognizes a vehicle's license plate number from the frames generated by the Live streaming video. It is fulfilled by the combination of a lot of techniques, such as object detection, image processing, pattern recognition. The variations of the plate types or environments cause challenges in the detection and recognition of license plates.

Today advances technology took License Plate Reorganization (LPR) systems from hard to set up, limited high, fixed based applications to simple mobile ones in which "point to shoot" method can be used. This is possible because of the creation of software which ran on cheaper PC based and also non-specialist hardware in which there no need to give predefined direction, angels, speed and size in which the plate would be passing the camera field of view. Also, Smaller cameras which can read license plates at high speed, along with smaller, more durable processors that can fit in police vehicles, allowed law enforcement officers to patrol daily with the benefit of license plate recognition in real time.

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