Virtual Traffic Police

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Abstract

In 21st century due to the advancement in technology and digitalization of healthcare networks, cyber attacks on these networks have advanced and are colossal. The need for protecting healthcare industry from such malice is undeniable. Healthcare information is at risk from malicious actors. Improvements in the state of information security and privacy in the industry are critical to the broad adoption, utilization and confidence in health information systems, medical technologies and electronic exchanges of health information. In this paper a survey on different types of most advanced attacks on healthcare industry and the damage they cause is discussed. Existing approaches to protect healthcare networks is highlighted and a framework for using Next Generation Firewall to detect and prevent cyber attacks is proposed. Additionally configuring the NGFW with a unique hospital network architecture is discussed. The need for an NGFW, its advantages and configuration of such a system is illustrated. Due to rise in road accidents, it has now become necessary to generate a system to limit accidental deaths. To keep a tab on the operators some tollbooths employ a system using fibre optic sensors to automatically classify a vehicle in the background and tally the results with the manual entries. However this system is expensive complicated and requires high maintenance. We aim to study the various systems that can be used to replace such a system with a cheaper and efficient alternative.

Keywords— Next Generation Firewall, Network security, cyber attacks, Application identification, NGFW, Snort , VLAN.

I. INTRODUCTION

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However the social scenario in India is significantly different due to problems such as poverty, unemployment as well as a considerably lower respect for rules. This makes it unfeasible to go for a completely automatic tollbooth. The industry requires an automatic vehicle classification system in India not to reduce or eliminate human intervention or labour, but to ensure that human intervention does not cause any financial malpractices. The industry requires a system that runs in the background and merely keeps a cross-check on the manual.

The traditional OCR based approach for number plate recognition does not work for the variations in painting style of the number plates. In this paper authors have presented an image retrieval based method to recognize the car number plate captured using a smart phone to facilitate the Car management system of a Smart office premise. In the proposed method a smart phone is used to capture the images and extract features of the car number plate.

These features are matched against predefined set of same car number plate images in the database. The character images are matched in an efficient manner to make it a real time solution.
As already stated, the system using fibre optics inherently possesses a large number of problems apart from the main concerns of high cost and maintenance.Although an IR curtain System reduces the cost significantly, it is still quite expensive And cheaper alternatives are desired

With respect to vehicle safety, India meets only two out of the seven vehicle safety standards by the World Health Organization (WHO). Two wheelers account for 25% of total road crash deaths. Nearly 75%motorcycle riders involved in accidents continued to wear helmets, crash records show. The main cause of these fatalities is people riding two wheelers under the influence of alcohol results and violation of traffic rules which later on results in serious accidents. These days there are some commercially available applications like Google Goggles that recognize images and text on the smart phone, captured by the smart phone's camera..

II. RELATED WORKS

A.Binary Image processing

This method is used to mine license plate regions from background images as shown in Figure. 1, it is a combination of edge statistics and morphology techniques. This process has achieved a 98 percent recognition rate from 9,745 images—supposing that the number plate frame's edges are perfect and plane. Moreover, this method of extracting characters from the binary image to define the no plate region is time-consuming because it processes all the binary objects. Furthermore, it gives an incorrect result if there is other text in the image

Figure: binarized processing

Greyscale Images are those images which contain only a single value that is each pixel has only a single value, they carry only the information of intensity under them. They are also known as black and white image or a monochrome image as they mostly in grey clour the intensity is divided in such a way that black has the lowest intensity while white has the strongest. We firstly start by converting an color image into an greyscale image.
Color processing is a fundamental step in image processing as well as for plate recognition as in most of the countries certain norms are fixed for the plate color and nos like in india the vechiles have to keep the letters in black with a white background.
But due to poor lightining conditions and plate location the output is not efficient that is why we need color processing so as to have an accurate retrieval of characters with greater efficiency

B. TensorfLow

Tensorflow is Google's Open Source Machine Learning Platform for programming data flow over a count of tasks. Hubs refer to numerical functions, while the edges of the diagram speak to the multi-dimensional points of information (tensors) within them.

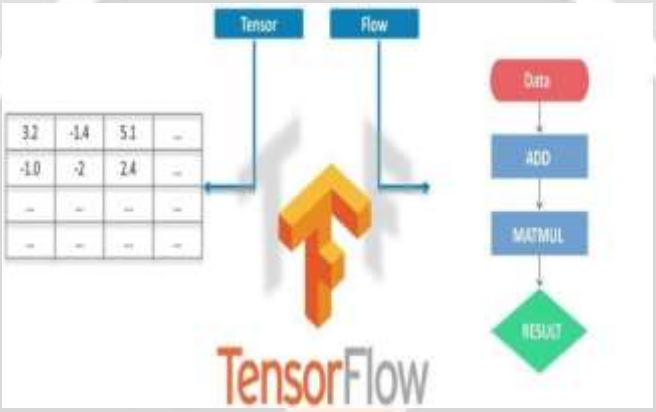

Figure 2 TensorFlow

OCR (optical character acknowledgment) is the utilization of innovation to recognize printed or transcribed content characters inside advanced pictures of physical archives, for example, a filtered paper record. The essential procedure of OCR includes analyzing the content of an archive and 1) Gray-Level Processing Greyscale Images are those images which contain only a single value that is each pixel has only a single value, they carry only the information of intensity under them. They are also known as black and white image or a monochrome image as they mostly in grey clour the intensity is divided in such a way that black has the lowest intensity while white has the strongest. We firstly start by converting an color image into an greyscale image interpreting the characters into code that can be used to handle information. OCR is now and again additionally alluded to as content acknowledgment.

The procedure of OCR is most regularly used to transform printed version legitimate or noteworthy records into PDFs. When put in this delicate duplicate, clients can alter, configuration and search the record as though it was made with a word processor.

III. Existing Systems

PC knowledge and character recognition, processes for certified plate recognition plays a main part in analyzing of licensed number plate. Hence, the basic componentsof any ANPR system is being developed. Number Plate Recognition scheme comprises of a camera, a edge capturing device, a PC, and custom intended software for image handling technique, examine and recognition. Over the last few years researches are going on regarding vehicle identifications. Some of the studies have been done just to analyze the

category of vehicle for example a car, van, bus, scooter or motorbike. In [12], Soble filter technique is useful in recognizing the type of vehicle accurately. Edges of a vehicle can be found by this technique. There are some techniques that are used to find out the model of the vehicles such as -The Contour let Transform and Support Vector Machine. To get fully assured about these techniques, these were practically done & analyzed. Maximum Average Correlation Height filter and Log r-theta Mapping methods were applied to analyze the category of automobiles. For revealing of region of interest in messy/jumbled situation, MACH filter was used.

IV. Proposed Method

The objective of this segment is to provide a detailed information about how to find a number plate in the captured image? Generally a monochrome camera with colour camera is used in ANPR system. Finding out the number plate area is a needed pioneer to certified plate identification. We can combine the approaches used to trace the number plate's position or section in images into three processing categories. To recognize separated characters, some processes use pattern image, grayscale, and colour. Character separation is a crucial method for recognition of characters, which we can similarly separate out /matching of template or learningbased classification.
Binary Image Processing This method is used to mine license plate regions from background images a it is a combination of edge statistics and morphology techniques. This process has achieved a 98 percent recognition rate from 9,745 images—supposing that the number plate frame's edges are perfect and plane. Moreover, this method of extracting characters from the binary image to define the no plate region is time-consuming because it processes all the binary objects. Furthermore, it gives an incorrect result if there is other text in the image

a. Plate recognition

Plate Recognition Last stage of our method is Plate recognition using Spanish number plates only. After detecting the plate, the plate for each character is proceeded to segment, and machine-learning algorithm is used to predict the character. For plate recognition we use an Artificial Neural Network (ANN). First we apply OCR segmentation, using OCR

b. Face Recognition

The face acknowledgment framework the "DeepFace" was created by a Facebook gathering of experts who recognize human faces in an advanced picture successfully. Google utilizes its very own facial acknowledgment framework in Google Photos, which consequently isolates all photographs dependent on the individual in the picture.
Facial recognition is correlated with various parts such as the ears, nose, mouth, and eyebrows.

Figure 3: Face Detection

c. Feed forward Neural Networks

The general structure of a feedforward neural network is showed in Fig. 1. Each circle in the figure represents a neuron. A feedforward neural network consists of a high number of neurons, were each neuron consists of a nonlinear activation function and followed by addition. There is no data transfer between neurons in the same layer; neurons only send data to neurons in the next layer. The feedforward neural network is widely

used due to its relatively simple structure and effectiveness in classification problems
In this work, the test images were not retouched to remove noise, and rather the objective was to implement a network that is capable of classifying images in the presence of noise, shadow, and other environmental imperfection
The output layer was used to generate a 5-bit binary number as an indicator for various characters, in this case, alphabet and numbers
Therefore a network size of 189−160−36 was configured for this application

When the optimum size for the feedforward network was determined, the network was trained and tested in Matlab. The dataset was divided into training data and testing set. The test data was only used to verify network's performance after the training was finished. In other words, the network has not seen the testing data during the training phase. The network was able to classify the noisy and imperfect images in 99.1% of times. Some of the misclassified images are shown in Fig. 3. It should be noted that the hardware realization of the network yielded a slightly lower success rate, due to implementation limitations which will be discussed in the next section. Also, the software version of the network used an approximation of the actual neuron transfer function used in the hardware realization of the system, instead of Matlab's generic nonlinear function.

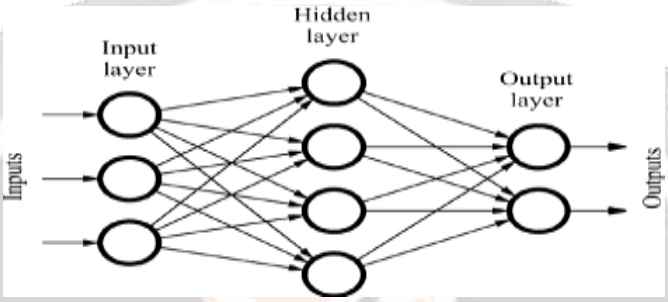

Figure 4: Neural Network

A neural network is a series of algorithms that endeavors to recognize underlying relationships in a set of data through a process that mimics the way the human brain operates. Neural networks can adapt to changing input; so the network generates the best possible result without needing to redesign the output criteria.

IV. Implementation.

YOLO algorithm employs convolutional neural networks (CNN) to detect objects in real-time. This means that prediction in the entire image is done in a single algorithm run. The CNN is used to predict various class probabilities and bounding boxes simultaneously. The YOLO algorithm consists of various variants
YOLO algorithm is an algorithm based on regression, instead of selecting the interesting part of an Image, it predicts classes and bounding boxes for the whole image in one run of the algorithm. Ultimately, we aim to predict a class of an object and the bounding box specifying object location

YOLO is popular because it achieves high accuracy while also being able to run in real-time. The algorithm "only looks once" at the image in the sense that it requires only one forward propagation pass through the neural network to make predictions. After non-max suppression (which makes sure the object detection algorithm only detects each object once), it then outputs recognized objects together with the bounding boxes.

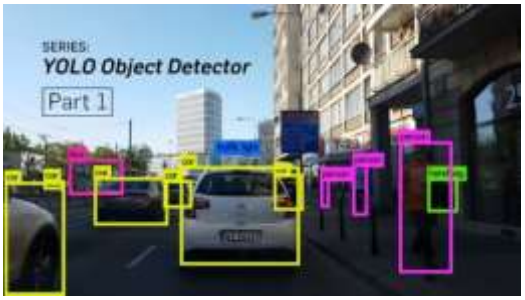

Figure 5: Yolo Object Detector

Confidence here refers to the probability an object exists in each bounding box and is defined as: C = P r

(Object) ∗ IOUtruth pred (1) where IOU, intersection over union, represents a fraction between 0 and 1.The class-specific probability for each grid cell

$$Pr\left(Class_i|Object\right) * Pr\left(Object\right) * IOU_{pred}^{truth}$$
$$= Pr\left(Class_i\right) * IOU_{pred}^{truth}.$$

is defined as:

YOLO uses the following equation below to calculate loss and ultimately optimize confidence.

$$\begin{aligned} Loss = & \\ & \lambda_{coord} \sum_{i=0}^{s^2} \sum_{j=0}^{A} \mathbb{1}_{ij}^{obj} [(b_{x_i} - b_{\hat{x}_i})^2 + (b_{y_i} - b_{\hat{y}_i})^2] \\ & + \lambda_{coord} \sum_{i=0}^{s^2} \sum_{j=0}^{A} \mathbb{1}_{ij}^{obj} [(\sqrt{b_{w_i}} - \sqrt{b_{\hat{w}_i}})^2 + (\sqrt{b_{h_i}} - \sqrt{b_{\hat{h}_i}})^2] \\ & + \sum_{i=0}^{s^2} \sum_{j=0}^{A} \mathbb{1}_{ij}^{obj} (C_i - \hat{C}_i)^2 \\ & + \lambda_{noobj} \sum_{i=0}^{s^2} \sum_{j=0}^{A} \mathbb{1}_{ij}^{noobj} (C_i - \hat{C}_i)^2 \\ & + \sum_{i=0}^{s^2} \mathbb{1}_{i}^{obj} \sum_{c \in classes} (p_i(c) - \hat{p}_i(c))^2. \end{aligned} \quad (3)$$

V. Result Analysis

A result is the final consequence of action or events expressed qualitatively and quantitatively. Performance analysis is an operational analysis, is a set of basic quantitative

This method successfully detected and recognized license plates from Spain. The method was able to successfully detect the Indian license plates too. Our system fast, efficient and cost-effective.

The whole system is implemented on PC with Intel core i5, in c++ we developed the algorithm using Windows operating system with OPENCV 3.2.0 library

To measure our method and precision we tend to perform our experiment on several prototypes of vehicles with entirely different forms, and dimensions below changing conditions. The method of segmentation did not produce desired results for plates at an associated degree and plates at the edge of picture taken, this confined the accuracy of the algorithm

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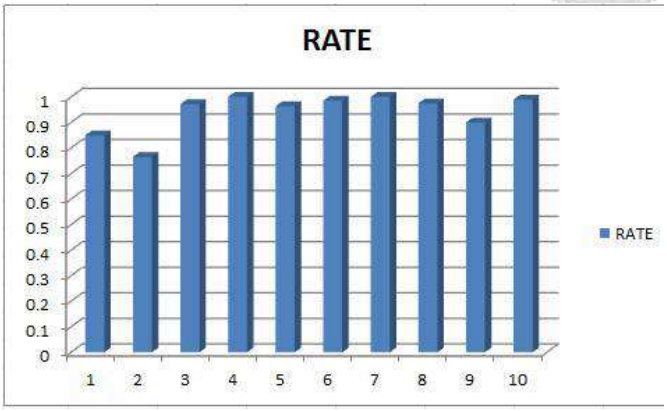

Template matching become used on quantity plates acquired from static photos and an average Accuracy of 82.6% has been obtained.The accuracy of each character (number 1-9,alphabet A to Z and a to z) has been shown in Figure. 7.This accuracy can be advanced significantly by way of putting the digicam definitely to capture the perfect body and the use of neural networks in two layers. The execution of the given method can be moved further for the popularity of quantity number plates of multiple vehicles in a solo photo body by way of the use of multi-level genetic algorithms.Additionally, a extra easier model of this gadget can be carried out by way of capturing pictures from stationery clip and choosing the great car border for category of vehicles and spotting the quantity plates the use of neural networks.

Figure 7: Accuracy of each character

Figure 8 depicts a comparison curve of tracking accuracy, in which the longitudinal coordinates represent the tracking accuracy and the abscissa represents the errors between the tracking target central coordinates and the actual target central coordinates

It can be seen that when the error of the central coordinate is less than 20 pixels, the precision rate of the proposed algorithm and the traditional algorithm are much higher than other algorithms. It can be seen that the tracking algorithm based on template matching can track the central position of the target more accurately. When the center coordinate error is greater than 4 pixels, the tracking accuracy of the traditional algorithm is less than that of the proposed algorithm.

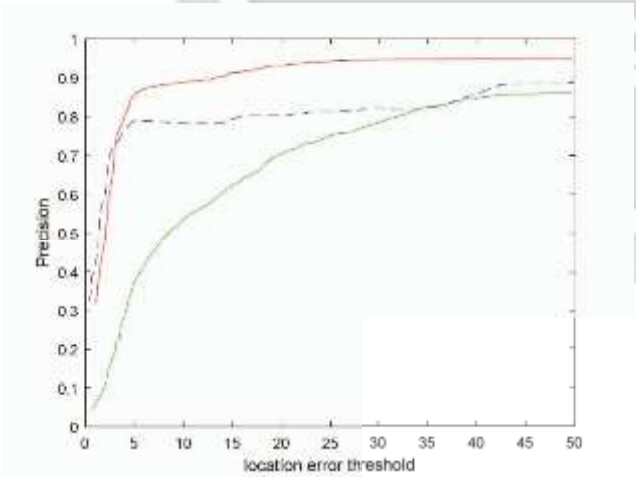

Figure 8:Tracking precision comparision

Figure 9: motorcycle detection

Using OpenCv the camera is opened. The image is captured frame by frame using FPS (frame per second).Frame is sent to YOLO algorithm the motor cycle detected as shown in the figure. If the helmet is not detected then using IP address it fetches the location and captured image is stored in the database. Captured image is sent to OCR to convert the Image to character as shown in figure. If location matches with application then captured image is displayed on the application

Figure 10: traffic police application

The Region of interest aims to compute a small region to reduce the computational cost and improve the helmet search. After, it is obtained a sub-window that contains the motorcyclist head region. Next, the features were extracted from the sub-window where the classifiers are used

The RoI determination is an important step in our problem. It is used to search the helmet. The motorcyclist head must be inside the RoI. Using RoI decreases the computational cost the search area. In our database, all images present the motorcyclist head region inside the RoI. The RoI was specified at the image top and corresponds to 1/5 of the image height

Figure 11:helmet detection

VI. CONCLUSION

The existing methodologies on this sketch and algorithms proposed in for quantity and car the no Plate recognition have been seen through. Because of the unavailability of such an ANPR gadget off the shelf in tune with our requirements, it's far our endeavour to personalize an ANPR system for instructional institutions.Template matching become used on quantity plates acquired from static photos and an average Accuracy of 82.6% has been obtained.the accuracy of each character.
A result is the final consequence of action or events expressed qualitatively and quantitatively.Performance analysis is an operational analysis, is a set of basic quantitative
This work deals with a road boundaries and painted lines detection for intelligent and autonomous vehicles. The purpose of the paper is to overcome the different constraints that could overwhelm the real-time road lanes detection and tracking. Those constraints are essentially due to the huge amount of data that should be processed in case of highresolution images, vehicle's speed, vibrations, etc
.Additionally, a extra easier model of this gadget can be carried out by way of capturing pictures from stationery clip and choosing the great car border for category of vehicles and spotting the quantity plates the use of neural networks.

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