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Security For Autonomous Vehicle Using Face Recognition for Smart Environment

Kartik Chauhan[1], Pravin Kr Mishra[2]
[1]M. Tech, Bharat Institute of Technology, Meerut, Dr. APJ Abdul Kalam Technical University, Lucknow, India
[2]Assistant Professor, Bharat Institute of Technology, Meerut, Dr. APJ Abdul Kalam Technical University, Lucknow, India

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ABSTRACT

As we as a whole realize that self-sufficient vehicle growing increasingly more step by step and by fostering the innovation the security issue is that the principle concern with respect to self-ruling vehicles. When a self-ruling vehicle is designed to assemble and store client logs, AI enters the picture to distinguish any irregularities. An assault identification model might be a spot equipped for discovering a signs and fix information got from the skin world through a web organization or ports inside the vehicle. These calculations is wont to identify unusual exercises, correspondence conduct, or undesirable orders like enact the leaving mode while the vehicle is on a street. In this paper, I examine about the ensure of keen vehicle. In which I utilized face acknowledgment calculation utilizing haa rcsacade classifier. we acclimated store the data of different clients or who can go into the vehicle .so that we guarantee about the one that need to go into the vehicle .so that in a specific case, we've all the connected data with respect to the individual .it can keep away from the instance of unapproved access and undesirable vehicles control and In future it will be more worry about the insurance of self-governing vehicle.

Keywords : Autonomous vehicle, Security, SVM, Face acknowledgment, Machine Learning

I. INTRODUCTION

Lately, the acknowledgment of the auto area is expanding wherever the globe. Yet, far-fetched there exist an un act mode in vehicles wrongdoing. At the present circumstance, most vehicles are controlled by means of utilizing manual keys, security cards, and secret word sort of example. Be that as it may, with the occasion of Machine learning advancements and bunches of installed components, the vehicle security frameworks are persistently improveing . These enhancements are figuring on the different calculations and procedures working on step by step. While, they're not just worried with the robbery of

vehicle substance, yet additionally the deficiency of vehicles and furthermore the individual security necessities of the vehicle's proprietor. Some notable security distinguishing proof and check methods existed. Face acknowledgment is considered a respectable decision biometric method For vehicle security and alert frameworks since it upheld outer body part highlight data and might work under various conditions. Along these lines, the vast majority of the face acknowledgment strategies are created to accomplish a superior pace of partisanship.

By utilizing this technique, when unapproved individual face is organizer needed any client data the framework will investigate it and send his/her picture to the vehicle's proprietor or potentially police workstation through network. Thus, the discovering consequences of the proposed framework with the help of Support vector machine utilized for grouping and relapse strategies.

Let zt be a framework sensors esteems obtained at time t.

$zt(a)=Dt[bt](a),\forall a\in A$ (K)

Where,

Dt meant as a changing component of the primary record bt, and a ∈ z2 shows the sensors esteems that having a place with the standard record A ⊂ z2. To the extent there is no new movement.

$Dt[bt](a)=bt(a)+\eta t(a),\forall a\in A$ (L)

Where,

ηt is an arbitrary variable assessing for record clamor esteems, and bt are obtained from a similar sensor despite the fact that ordinarily bt ≠bt − 1; since upsides of a framework record are changed. When at time τ

* an outside aggravation presents a new, the record bt is corrupted by an unapproved individual or obscure individual action and zt becomes:

$Dt[bt](a)=\int b(e)ht(a,j)dj+\eta t(a),\forall a\in A,t\geq\tau^*$ (M)

Where, ht(a, j) is the worth spread capacity at esteem a ∈ A.

The proposed SVM framework used to dissect a grouping of {zt, t = 1, . . . , number of sensors} to distinguish and perceive any unapproved face and time moment τ* when new movement happen as in condition (M). We accept that T0 is sans unfamiliar qualities are accommodated preparing.

1.1 Existing framework

In existing Machine learning based face location draws near, Supervised Machine learning approach not created the named datasets to distinguish the identification model. In contrast to the principal class, of self-sufficient vehicle in the another methodologies no named dataset is expected to assemble the identification model, as they have a place with diffrent levels of self-governing vehicles advancement.

Disadvantage

1.Another AI approaches can't anticipate the new viable and assault practices, due to there Presence of loud information subsequently they diminishes the exhibitions of the classifiers.

2.The principle downside of Another AI approach have high bogus positive rates.

1.2 Proposed framework

Regulated machine leraning approach is exploiting every one of the strategies, which is able to chip away at both named and unlabeled datasets. furthermore, produce the dataset as a csv design so we can utilized it further as workable for data. regulated part incorporates entropy assessment, bunching and relapse proportion. The managed part is the help vector machine classifier.

Benefits:

1. The objective of SVM is to vanquish the datasets into class to track down a most elevated peripheral hyperplane (MMH).

2. The SVM classifier of our way to deal with decline the undesirable and uproarious typical information, which decline the bogus positive rates and expands the exactness of directed part.

II. LITERATURE SURVEY

The Autonomous vehicles functions, which cause avoid vehicle theft. Many authors are performing on vehicle security systems to supply the simplest techniques not only concerning with the theft of auto

contents, the loss of vehicles, and more important the knowledge regarding the customers/person and also the personal security requirements of the vehicle's owner. consistent with their works; they need developed a vehicle security systems supported "Biometric Authentication" type like eye, finger, face recognition, etc [5] [6]. This section describes some relevant collaborations which are proposed in recent years.

Authors in paper [1] propose anti-theft and person recognize embedded system. They used biometric identification to access the vehicle. Authors claimed that the system deploy LBPH algorithm for face recognition. Also, they showed that the system was simple and provided better improvement to various conditions of the vehicles.

As indicated by [3], creators proposed a minimal expense model for execute brilliant vehicle security framework. Inside which creators guarantee that the framework comprises of a face recognition sub framework, a correspondence module and an impression place. The enhanced Haarcascade classifier calculation is utilized in face recognition framework. Likewise, it can perceive faces while access the vehicle, and make a caution soundlessly.

Creators in [9] introduced a model and foster face acknowledgment framework. They utilize a Haar course algo to recognizing faces from a given picture. Then, at that point, the framework create a man-made Neural Networks ANN for face acknowledgment. Creators needs a framework experimentation; it can perceive human countenances with a precision of 88.7 %.

In [7], Authors guarantee that an alternate stage model for face identification is creates as a joining upheld Viola and Jones calculation, Gabor Filters, and Principal Component Analysis PCA. Then, at that point they utilize an engineered Neural Networks ANN for face acknowledgment which give an exactness 97.3%.

In [2], creator depict that the arrangement of commonsense innovations to carry out a brightening powerful, buyer grade biometric framework upheld face acknowledgment to be utilized in the auto market. It tends to the difficult open air conditions inside which driver recognizable proof is anticipated to control. the motivation behind this examination is to explore pragmatic face acknowledgment utilized for character the executives to decrease algorithmic intricacy while making the framework hearty to surrounding light changes.

The fundamental point of the add [8] is offering progressed security framework inside the vehicle. The program comprises of a secret word custom to fulfill face discovery program, a correspondence module and a major stage. Additionally, face location framework utilizes the streamlined Local Binary Pattern (LBP) calculation to distinguish the essence of the clients. Added more, the framework utilized the PCA calculation as face recognition.

III. PROPOSED METHODOLOGY

This part depicts the thought behind the SVM Model framework. Along these lines, that the fundamental point of the proposed framework is utilized as a recognition and recogniztion the essences of unapproved individual. Also, our proposed framework gives a minimal expense, model expansion in the conduct f the vehicle is the most critical to execute a foster continuous vehicle security framework. Subsequently, the framework should get the character of proprietor vehicle's first , then, at that point give him an approval to access in his/her vehicle framework. The proposed framework has a blend of biometric procedures, implanted gadgets and calculations to plan powerful reconnaissance vehicle security system.which give each information in CSV record design with all its ID data like name, portable number, connection with the vehicle proprietor or the client.

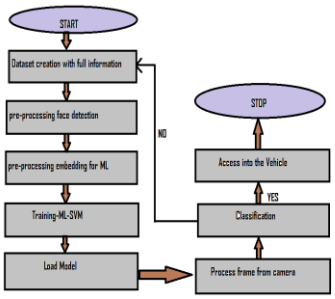

Figure1: Flow chart

3.1 System initialization and configuration

This subsection focuses on model configuration which all vertices are established to attach. The proposed model network should contains the IEEE802.15.4 which utilized in the physical layer to produce wireless communications, such the bits of information packets after they need been converted into signals may be transmitted to the vehicle's owner. Dataset is being created after person is access into the vehicle camera detect the database and find the similar face if exits , and if face isn't find it's ready to create new dataset and access the vehicle.

This system executes the subsequent tasks:

– Importing python libraries and packages: These libraries are predefined and help to create the interface modules work properly.

pip install opencv

pip install sklearn

– USB Camera setting and configuration : After these configuration settings of USB Camera, the system was rebooted. This was done to make sure that the camera was allocated enough space in memory. The camera takes 5MP image and it's a resolution of 640 × 480. the subsequent command was used (fswebcam image.jpg) on the image.

– Generating and initializing the informationset : first generates the data and make dataset. if dataset is made then processing that dataset when access into the vehicle.

3.2 worship and preprocessing phase

The aim of image worship is to get the pictures of one who want to access the vehicle face in real-time employing a camera module and stored within the database for the training and testing process. during this phase, the photographs are normalized and enhanced to enhance the flexibility of the detection/recognition phases. Therefore, some metrix property performed under different conditions like climatic, without/with specs, genders, and ages, etc. which help to provide feature distinguishable within the image processing phase. Hence, after the photographs are worship, the system will encounter some challenges like fickle lighting, variable background, and other some obstacles. Therefore, image preprocessing will normalize the image intensity, uniform size, and shape.

While, picture preprocessing might be a procedure to help crude pictures/signals got from cameras/sensors set inside the vehicles. In this way, The preprocessing steps should carry out are as per the following:

- make dataset to get to the vehicle with individual data.

– Start the camera and set to catch video transfer.

– Grab a casing from the video transfer. In the event that edge is snatched, proceed with the strategy.

– Else pause and Initialize the casing in light of the fact that the current casing.

Definition:

Leave V alone a gathering of qualities for any picture

Give picture with values E access V

In this way, I : E –→ V,

Where,

I(x) is named the value of pixel x for I

Let K the arrangement of all pictures with numbers esteems in E.

Thus, picture in I(k)is additionally called the value of rgb of the picture.

– Image obscuring: obscuring idea infers that the picture looks more nitty gritty on the off chance that we will see every one of the items and their shapes effectively in it. Obscuring will be accomplished from multiple points of view. Gaussian haze strategy (additionally called Gaussian smoothing) is utilized to obscure the picture. it's wont to decrease clamor

inside the picture. In addition, Gaussian smoothing is utilized as a Preprocessing stage to support picture structures at various scales. The condition of a Gaussian capacity is (N):

$G(x) = 1/\sqrt{2}\pi\sigma 2^{*}e- x2/2\sigma 2$ (N)

– Capture another frame and repeat the above steps.

– Check for pixel weight if enough to call motion detected function

– Then draw a quadrilateral around the region where motion was detected.

3.3 Face detection and Face recognition phase

Different methodologies in the field of face recognition are created lately. Like observation framework and sex arrangement are utilizing face discovery innovation as a piece of face ID. While, Face recognition procedures centered to recognize the front substance of an individual like construction and size in any advanced picture. Consequently, it discovers just the look then, at that point find with the remainder of the picture as foundation. This paper present an Autonomous vehicle security model utilizing face location strategy Haar course. It's anything but an AI hub recognition calculation used to discover an individual in picture or video. In light of the idea of Haarcascade algo which proposed by viola and Michael. The most focal point of the Haar course Classifier is that it stay away from the districts that improbable to have coordinated in the image picture. This calculation partitions into four phases:

– Haar highlight choice: the center advance of Haar course classifier is to gather the Haar course Features Where a Haar course algo comprises neighboring quadrilateral objects of pixels at a specific area to discover a locale. Then, at that point summarizes of all the pixel power in every area and computes the standard change between these entireties to decide relative light and dim areas. For example

f(x) = Sum quadrilateral(pixel powers) –

Total rgb square shape (pixel forces) Some various kinds of haar highlight are displayed in Figure3:

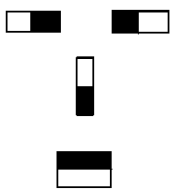

Figure: 3 haarcascades features

– Creating necessary pictures : for quick registering of theories includes; the fundamental picture is finished. Condition (O) shows the computation of the amount of all pixels inside some random square shape. It needs just four-pixel esteems, what start from upper left of the cornered pixel(x, y).

$p(x,y)=\sum x' \le x, y' \le yi(x',y')$ (O)

– Ada Boost preparing: The subsequent stage to develop Haar course classifier to choose the significant Haar highlights is utilizing Ada Boost learning calculation. It is utilized to identify the appearances in the double picture by extricating the best highlights. A blend of frail classifiers can deliver a solid classifier as displayed in the accompanying condition:

S(x)=A1W1+A2W2+..+AnWn (P)

Where, wn are n feeble classifiers characterized as in seven which used to build a S(x) solid classifier.

wj = 1 Pi fi ≤ Pi θi–1

Else (Q)

With the end goal that

Pi : is the inclination course.

θi: is the edge.

Fi : is a trademark work– Cascading classifiers: the Haar cascade classifier is a series of stages. Each stage contains a powerless classifier which prepared to be solid. Thusly, assuming the picture passes all stages, the picture said to be a human face, in any case, implies it's anything but a human face.

Face acknowledgment is viewed as a significant stage in security frameworks. While, numerous strategies center to expect better acknowledgment inside a constant when applied on high computional power.

However, probable, an ongoing handling for face acknowledgment in-vehicle security model might be significant where the violations were done across local people. Consequently, the vehicle security model will have sufficient opportunity to check the individual. Since, face acknowledgment in-vehicle security framework is execute, so picking an appropriate calculation is vital. This examination work explores to utilize the Principal Component Analysis (PCA) calculation in perceiving faces which applied on low force processor. PCA is a numerical technique that depict a change Weight of high-authority facial pictures n into few-authority head parts m called Eigenface where m < n. In our security framework; we have a vehicles and have an approved individual. While for every individual, our framework will gather 50 pictures to be prepared as eigenfaces. These pictures have been standardized as 64x64 pixels. The preparation results are gathered in train document as those with the biggest eigenvalues. The PCA calculation in the framework is displayed in the accompanying advances:

– Step 1: Let I is an Image having size (M × M).

– Step 2: Convert I to Γ having size (P ∈ 1), s.t. P = (M × M).

– Step 3: Suppose we have a preparation set : Γ' =[γ'1, Γ'2, ..., Γ'N]

– Step 4: Calculate the normal by ψ =1N∑Ni=1 Γ' I

– Step 5: Calculate the varies for each face Φi = Γ 'i – ψ, then, at that point the distinction network characterize as A = [Φ1, Φ2, ..., ΦN].

– Step 5: Compute the covariance network by C =A AT with size (P×P), then reduce the size using L = AT A, with size (N × N).

– Step 6: Calculate the eigenvector by ATA Xi = λi Xi,where, Ui = AXi is the eigenvector, and λi is the eigenvalue.

– Step 7: Compute the projected face image by Ωk =VTj Φi.

– Step 8: Now test image Γ' t using Φi = Γ' t – ψ

– Step 9: Compute the projected for test image using Ω = VTj Φt.

– Step 10: Compute the Euclidean distance to find the minimum distance between the test image and training image using ε2j= ||Ω – Ωj ||2 , then , if εj (min) ≥ Θ then the image is unknown, also if εj (min) ≤ Θ then the image is known face.

RESULTS

The proposed security system is evaluated on face datasets which are CSV dataset. and our dataset which were collected from a vehicles, every vehicle have authorized person. Whereas, for each authorized person, our system will gather 30 images to be trained as eigenfaces. Then every authorized person was tested, 100 times without glasses and 100 times with glass. Also, for every vehicle, we test on 5 unauthorized person where everyone was tested 100 times. All experiments have been performed using Intel Core i7, 4 GHz processor with 4 GB of RAM. The experiments have been implemented using python language environment with CSV database and micro-controller and c plus plus language using some sensors.

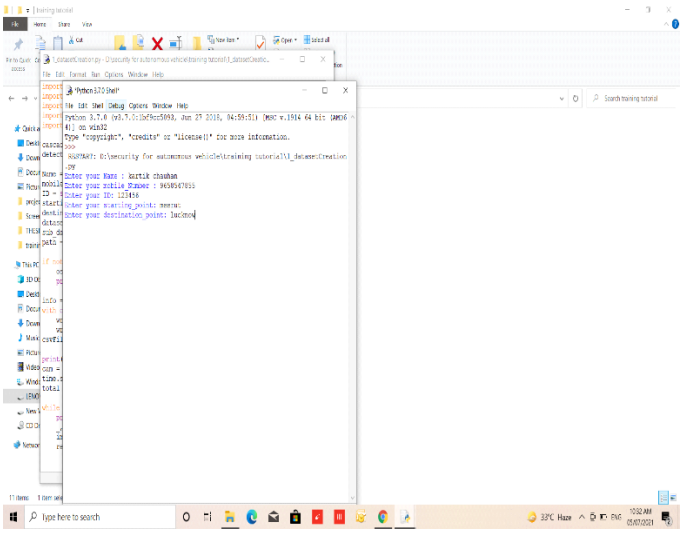

Figure 4.1 load dataset

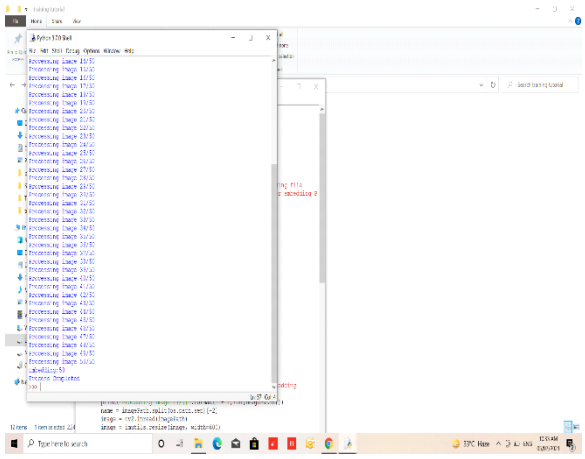

Figure 4.2 processing dataset

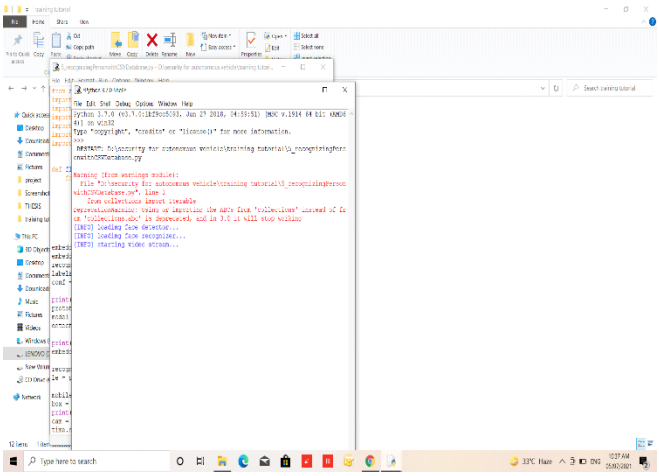

Figure 4.3 face detection training

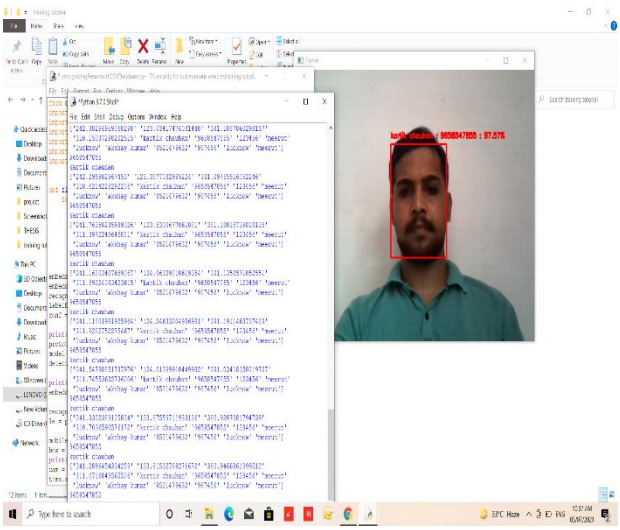

Figure 4.4 face detected with accuracy 97.87%

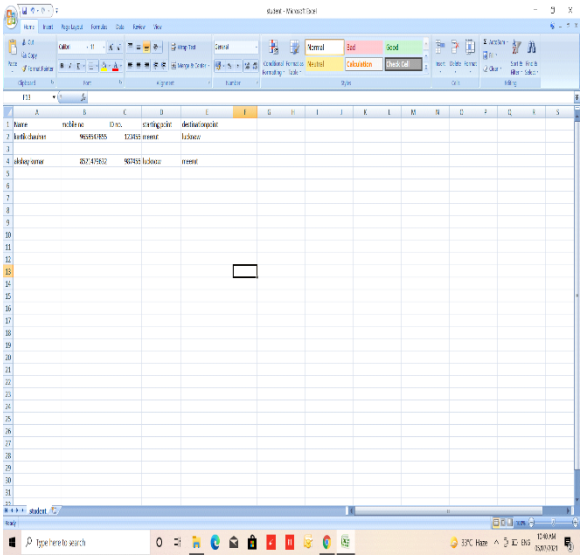

Figure 4.5 data stored in csv

IV. CONCLUSION

This paper proposed an Autonomous vehicle security model utilizing a safe, productive, minimal expense, and Low Power Processing chip with the Internet as its fundamental part. Also, this paper portray an algorith (Haar Cascade + PCA) for face location and acknowledgment of the caught picture by a camera module. Though, the Haar course Classifier can be utilized to keep away from the areas that isn't comfortable to have comprise in the picture. Additionally, it is utilized to discover the appearances in the picture by alter the best highlights. While PCA is a numerical demeanor that communicated as a change of high-authority facial pictures into low-authority head parts called Eigenface which used to perceive faces in the picture. As per the essential and prior lab results contrasted and different frameworks, the proposed framework accomplished the best exactness rate on information, while more productive when applied on our dataset to track down the approved and unapproved individuals. Likewise, the framework upgrades the affectability to 97.7% which is significant when the framework work under various brightening conditions hen the worth of the limit is 3*110 and 3.40*103. Just as, the proposed framework upgraded the time contrasted and different frameworks which accomplished 0.162 sec.

Furthermore, the outcomes introduced that cameras pixel size 640×480 gave better memory space and CPU usage more than others 78% and 50.5 MB separately which is significant for the constant vehicle security frameworks. In this way, because of its minimal expense and superior, it is entirely reasonable for working on the security for the vehicle area.

V. ACKNOWLEDGEMENT

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