REAL TIME EYE BLINKING FOR PASSWORD AUTHENTICATION

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Abstract - *alpha numeric passcode are wider used for the process of authenticating a user accessing system. alpha numeric pass code authentication requires using unique Id's that require users Id's through this process can easly crack the unique Id's or shoulder surfing and also thermal tracking unique Id's authentication with hand-off are blink password entry technique on the other side no foot prints behind and these provide. Enter option eye blind based password authentication referring to find the eye blink across the sequentially process the image frames and generate the numeric passcode. Our project represent the RTA to combine eye blink-based password entry and face detection and one time password(OPT) to avoid shoulder suffering.*

Key Words: **Machine Learning, Classification algorithms, proposed system, HARR cascade face detection, local binary pattern histogram Prediction and classification**

1. INTRODUCTION

Security is the general process of verifying the identity of the person. This process should be faster, high accuracy and secure. User must be authenticated them self everyday using conventional approach like password but this technique are dangerous because this approach can be observed by the hackers who uses the Different skills such as hacking of the personal data and also corrupting users personal data and also these are many security issues due to lack of communication between the system and user. As their result to overcome this problem the research proposed three layer security process to secure unique Id's. Where the user allowed to enter pin through blinking eyes at the suitable pin through this method can avoid the shoulder surfing. Eye blink passcode authentication provides the good solution to provide security for the system. Main aim of this project is to provide security through eyeblink authentication system

1.1 MOTIVATION

The use of alpha numeric pass code or personal Identification process are widely used by the users such as money management system in automatic teller machines(ATM's).online transactions, unlock Smart phones, opening doars. These PIN's are majorly used to secure personal data, authentication will be always the challenging part even using the pin authentication. According to Indian RBI Bank the number of incident of ATM fraud has increased from all cases in 2017-2018 to 980 cases in 2018- 2019. The fact the authorized person should enter the PIN

authentication code in the public places this make pin entry In Peril to password attack. Such as thermal tracking and Shoulder surfing. So we have motivated to implement the real time eye blink password based authentication system to avoid major problems.

2. RELATED WORK

Secured PASSWORD-Entering Against Human Shoulder-Surfing Activity:

When customers enters their pins or passwords in a croweded area, his passwords may steeling by someone. The entered pin be able to seen by someone more successfully in a overcrowded places. So a new Method has been invented to overcome this issue known as Cryptography Prevention Strategies. The original BW method is used to protect the human shoulder surfing invasion. In each time, a keypad is coloured at odd. the particular person who have the PIN can only login By pressing the specified colour keys. The IBW method is checked to be secret against human nemesis due to the imprison cognitive abilities of humans. Also the IBW technique it has been proven against any hacking attack [1].

Gaze-Based PIN Checking using Automatic Clustering of Gaze Points Performance:

Researchers have proposed an eye follower for users to enter PINs by seeing the particular text on the computer screen. This visualization technique is deterrent to the study of shoulder surfing: Key users' keystrokes are secretly tracked while inserting the PINs on the keyboard. In this paper we express the identification system for users to verify their PINs by

seeing at the icons on the on-screen keyboard. Currently eye-tracking based authentication techniques asks the customer to enter a trigger when seeing at each symbol. alternatively, in Eye Dent, viewpoints are dynamically clustered to determine the user's viewed texts; This method has the advantage of accepting users to focus on their normal speed Fixed dwell time. Additionally, without visible trigger couldn't reveal the number of texts in the PIN. Preliminary investigation outcome point out that rapid (3 sec per 4 digit password) By Using This Project Visualization is possible, but to compute the calibration error more tasks is required[2].

Demonstrating the effectiveness of thermal camerabased attacks:

In this project, we retrieve code typed on keypads under different circumstances by using thermal camera and also check the ability of this camera. This problem has the accommodation of using a conventional camera that does not need to capture them when typing the codes and can recover them for some amount of time. To get the effectiveness of such attacks, several variables are considered: The object on the keypad, customer inputting the code, the length between the camera to keyboard and the technique used to analyses the code. First, we represent code retrieval results from a human review of this tested data sets. It provides the starting point for the effectiveness of thermal camera based attacks. Next, we automatically extract data using computer vision techniques from raw data taken trough cameras, thus examines that the attack has the potential to scale well in practice [3].

Drag-and-Type: A New Method for Typing with Virtual Keyboards on Small Touch screens Performance:

Touch screen are mostly used in electronic devices like smart phones, laptops and some of the electronic devices. However, entering some input using small touch screen is still worth the study. It means touch screen device users are having trouble entering alphanumeric keys using their fingers, and a small virtual keyboard with less tactical keys can provides less functionality for the users. This project provides new typing style called Drag-and-Type, With out tapping on the touch screen on a small virtual keyboard which provides drag-and-drop features. Also increases typing speed, When the customers necessarily needs typing they may choose this method, for example, When entering some more sensitive Passwords or PINs . In that sense, the proposed method for the extension of Secure Drag-and-Type is further explored in order to secure a password entry against hidden viewers and cyber attacks under the drag and type model[4].

Eye movement detector using smart camera sensors performance:

Currently eye and iris movement detector is necessary for look-up PIN access, Internet users learn security application for motherland. For this project, lab view and vision software tools and smart camera sensors are used to generate eye movements and tracking programs. On-board image processing algorithms are uploaded to the smart camera. Eye tracking will be achieved when detecting the same image features in multiple frames and correlating them to a specific. Algorithms for eye detecting and tracking are examined through different conditions, including different frames of the face, speed of head movement, and eye movement to determine their usefulness for the intended applications. This survey will present the algorithms and

performance results of the implemented algorithms in a camera [5].

Real time eye blinking for password authentication Performance:

The Haar Cascade Classifier is a machine learning technique where the work of the cascade is trained by many positive and negative images. However, the algorithm requires many good images (face images) and negative images (faceless images) to train the student, the face recognition using CNN face perception is as complex as the facial expressions cover a wide and diverse area of the brain. Brain imaging studies often show increased activity in the acetum fusiform gyrus, also known as the temporal lobe, causing prosopagnosia when the area is damaged especially clearly learns to differentiate one person to another at about four months of age [6].

An Eye Blinking Password Based Liveness Monitoring System to Improve the Detection of Video Spoofing Performance:

The present-time checking system gives up the possibility of excellent security, but such a system must be unnoticed and protected. In this work, we learned whether a commercial eye movement detector can be used for unnoticed, continuous, present time user checking through iris identification. Iris detection through the eye tracker can enable present-time perpetual visual acuity when combined with other more reliable visual acuity techniques. As eye trackers make their capabilities widely available for multiple components, continuous optics are stronger [7].

Deep Neural Network for Human Face Recognition Performance:

The nerves System is a animal brain induced algorithm designed to detect formats in numbered datasets. The nerves system is combined by different layers and a layer is combined of many nodes. Depending on the type of model the nervous system is trying to study how to input each input data to the node. Those weight determines the significance of the input data in delivering the final result. The total weights of the input data is performed arithmetic operation and the output of the node is determined depending on some threshold bias. by using activation program the mapping of the input is performed.[8].

Liveness Detection Using Eye Blink A case Study Performance:

Blinking the eye as a proof of vitality to exclude the use of certain duplicates, mainly 2D images, to deceive the facial recognition systems Different strategies have been developed in this field. Some techniques are: Video Blink Detection with Dynamic ROI Stabilization Gray Scale Intensity Based Algorithm, Cascade Ad-Boost and HMM. The

results show that the measurement of the blink parameter of the eye provides reliable information for detecting the vitality of the individual. Here we present an existing case studyVision detection techniques based on eye blink [9].

Current time continuous iris detection for Authentication Using an Eye movement detector performance:

The greater security will be provided by present time checking system, but such a device must be unnoticed and secure. In this job, we learned whether a mercantile eye movement detector can be used for unnoticed, continuous, current-time user checking through eye movement recognition. Iris detection through the iris tracker can enable real-time continuous visual acuity when combined with other more reliable visual acuity techniques. As eye trackers make their capabilities widely available for multiple components, continuous optics are stronger [10].

Table -1: Summary of Eye blink based secure password system

AUTHOR	TITLE	FACE DETECTION	EYE DETECTION	ACCURACY
Ms. R Revathy, Mrs. Bama	Advanced Safe PIN-Entry Against Human Shoulder-Surfing	-	BW method	In the range of 45 to 65%.
Justin Weaver, Kenrick Mock, Bogdan Hoanca	Gaze-Based Password Authentication through Automatic Clustering of Gaze Points	-	simple clustering technique	70%
Keaton Mowery, Sarah Meiklejohn, Stefan Savage	Heat of the Moment: Characterizing the Efficacy of Thermal Camera-Based Attacks	-	Computer Vision	75%
Taekyoung Kwon, Sarang Na, and Sang-ho Park	Drag-and-Type: A New Method for Typing with Virtual Keyboards on Small Touch screens		Drag-Drop Based PIN	80%
Mehrube Mehrubeoglu, Linh Manh Pham, Hung Thien Le, Ramchander Muddu, and Dongseok Ryu	Real-Time Eye Tracking Using a Smart Camera	OpenCV	Computer Vision	82%

2.1 proposed system

Existing System:

The use of fingerprint authentication is the biometrics for the security purposes. But this type of authentication process can be hacked and also by using the alpha numeric passcode or PIN's these are widely used by the peoples The use of alpha numeric pass code or personal Identification process are widely used by the users such as money management system in automatic teller machines(ATM's).online transactions, unlock Smart phones, opening doars. These PIN's are majorly used to secure personal data, authentication will be always the challenging part even using the pin authentication.

Disadvantages of Existing System:

• Major passcode attacks, for example shoulder surfing and thermal tracking

• Security controls based on PINs.

• Strong identity check will not be provided.

• The major disadvantage of the pins are are brute force attacks

Proposed System:

To avoid attacks like shoulder surfing and thermal tracking we are going to provide three layer security such as face reorganization, eye blink verification and OTP generation by combining these we are going to to develop our secure framework to avoid security threats. In this framework these will be physical entry of authentication process will be avoided Advantages:

• Prevention of password attacks

2.2 methodology

Open cv

Computer vision is an interdisciplinary scientific field which mainly deals with the understanding of image and video processing. This involves sensing of visual spor,openCV will sense whatever its see and complex information will be extracted through opencv that can be used in machine learning activites.The different application of openCV are:

• **Autonomous Vehicles** -

It is the one of the best application In openCV. as mentioned automatic cars needs to gather complete data about the surrounding and act according to to stored data of the surronding

- **Image Search and Object Recognition-**

Now we can find the objects the images using technic called image search. Let us consider the example as google lens in this method we can search a particular object inside the image by clicking the picture of the image and openCV algorithm will search through the catalogue of images and information will be extracted from the image.

- **Facial Recognition-**

This is also one of the most important application of opencv where electronics devices uses face authentication technology to basically to authenticate the identity of the user.

- **Robotics-**

Most of all robotic machines, in process of manufacturing, they should read or view the surrounding and gather complete information to perform the operation in hands. Process of manufacturing the machines may be used to inspect assembly tolerances by "looking at" them. We use the following algorithm for eye blink password authentication process

➢ HAAR Casecade Classifier
➢ Local Binary Pattern Histogram(LBPH)

1. HAAR Cascade Face Detection:

Haar Cascade is the method of object detection algorithm in machine learning which objects are identified in image or video processing and HAAR cascade face detection algorithm was found by the Paul Viola and Michael Jones in their paper "Rapid Object Detection using a Boosted Cascade of Simple Features" in 2001.

HAAR is based on the approach of maching learning. lots of positive images and negative images are required to train the cascade function and then used to detect objects in other images.

HARR algorithm has divided in to four stages:

1. Haar Feature Selection

2. Creating Integral Images

3. Adaboost Training

4. Cascading Classifiers

HARR cascade is able to le to detect faces and body parts in images, but can be trained to identify almost any object.

For example Let us considered the face detection. Firstly the algorithem needs lot of positive images of the phase and

negative images without faces to train the classifier. The we should extract the feature

In the first stage of HARR cascade is the collection of feature . A Haar feature is used to considers adjacent rectangular regions at a specific location in window, pixel intensities will be increased in each region and calculates the difference between these increased pixel
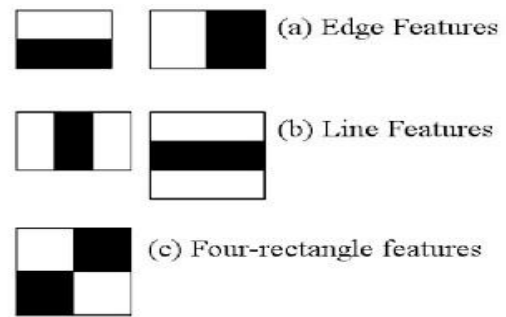

Fig 1: Different feature

Second stage is Integral Images,this images are used make process fast. Most of the calculated process are irrelevant. By considering example, by taking the below image image . two feature are shown in the top row.the first feature choosen seems. Different properties to focus on the region of the nose and cheeks should lesser then the region of the eyes. in second feature that is selected were the property that are selected the region of eyes should be darker then the region of bridge of noce. But cheeks will be applied by the same window or other place it cannot find the relivent factor

Fig 2: Focusing on the feature

In the third stage in 160000 feature how can we select bestthing?. This can be achived through the concept called Adaboost, this concept selects both finest features and also classifiers are instructed to use them. HAAR algorithm can build both strong classifier as well as weak classifier.

In the processing of detection phase, on the input image the pointer of the window will be moved , and HARR feature will be calculated on each sub region of the given image. After calculating the difference between this both will be compared threshold separates non-objects from the objects.

Because each Haar feature is only a "weak classifier" a large number of Haar features are necessary for this object with sufficient accuracy and they are organized into *cascade classifiers* to form a strong classifier. Final stage of the HAAR algorithem is Cascade Classifier
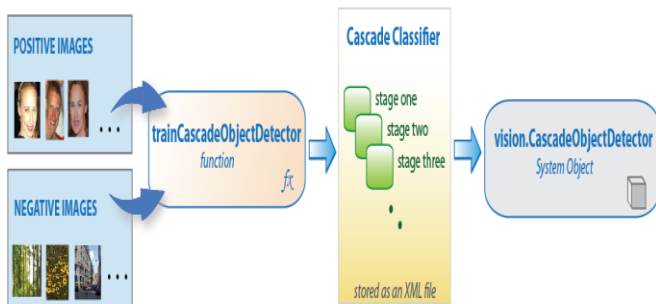
1.1 Cascade Classifier

Fig 3: Stages of classifier

The cascade classifier is a collection of stages. where every is the cascade classifier. And this classifier is the group of weak pupils are the simple classifier, and this classifier are also known as decision stumps. To train each stage bosting technic is used. boosting is a technique used to train each stage. Boosting provides the ability to train the accurate classifier by taking waited average and decisions that are maid by the weak learners Region will be define current location of the window placed at either positive or negative in the stages of classifier lables if the object is found in the window then it indicate positive. . if the object is not found then indicates negative, of the categorization of this division will be completed and the detector slides in the windows to next location. If the object found at the current window location then the detector side will report at the last stage of the classifies that the given division is positive and the negative image sample will be deleted faster from the stages. It assumes it is the larger part of windows does not contain object of interest. And also, the true positive, false positive and false negative are rare that taking time to verify.

- *True positive* occurs when the image sample is classified correctly.

- *False positive* occurs when the negative image sample are classified as positive.

- *False negative* occurs when the positive image sample are classified as negative.

Each and every stage in the cascade should be a less false negative rate. If the object from each stage labels are incorrect, the classifier will be stopped, and after that you cannot be able to correct the mistake. Nevertheless, each and every stage can be able to have a highly false positive rate. If the detector slides incorrect label the non-object as positive, we may correct the errors in the subsequence stages.

Additional supplementary stages decrease the overall false positive rate, and also decrease the true positive rate. Set of positive image samples and a set of negative sample images are required for the classifier training. We must provide a set of positive images with is the divisions of interest that specified will be used as positive image sample. Image Labeler is used to label the objects of interested towards the bounder boxes. The Image Labeler outputs the table that are used for the positive image samples, as same as the way we must provide the set of negative images. By which negative samples will be automatically generated. Through this acceptable detector accuracy will be archived, and also sets the number of stages, feature type, and the other functional parameters will be archived.
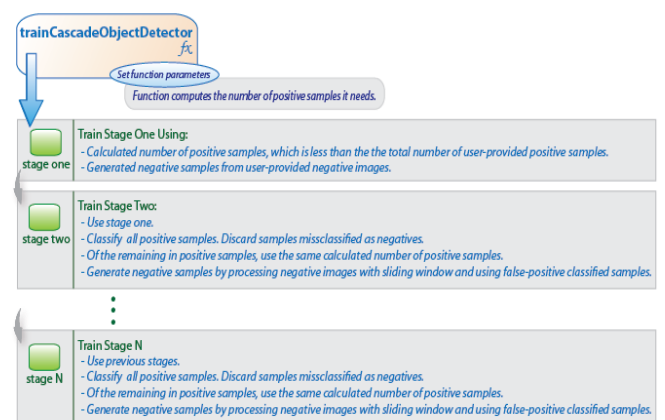

Fig 4: Stages of object detector

2. LBPH Face Reorganization:

LBPH is one of the easiest way of face recognition algorithm, these algorithm are widely used for the face recognition now a days LBPH algorithm is the robust against the monotonic grey scale transformation .This algorithm was invented in 2006. It is mainly based on local binary operator. This algorithm contain computational simplicity and discriminative power so it is widely used for face detection. Different steps to perform LBPH algorithm are:

- creating dataset

- face acquisition

- feature extraction

- classification
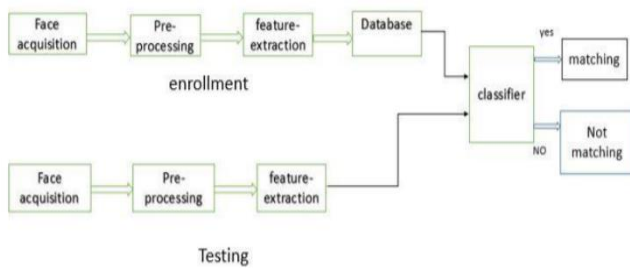
The LBPH algorithm is a part of open cv.

Fig 5: Testing process of the LBPH algorithm

- let us conisider the image having the different dimention N*M.

- We divide the image in to different region of same height and width. Everey region should have n*m dimentions that are of same height and width.

Fig 6: Dividing image in to region

- for every individual region local binary operator is used. The local binary patterns operator is defined in window of 3x3.

$$LBP(x_c, y_c) = \sum_{p=0}^{P-1} 2^P s(i_p - i_c)$$

As the mentioned in the above mathematical analysiss '(Xc,Yc)' is middle pixel with deadline 'Ic'. And 'In' that being the deadlines of its intimate pixel Using pixel data as threshold,this will compare a 8 pixel which are closest by performing operation .

$$s(x) = \begin{cases} 1, & x \geq 0 \\ 0, & x < 0 \end{cases}$$

- for every individual region the Local binary operator is used. The local binary patterns is defined in window of 3x3.

- If the central value will be less than or equal to the pixel neighbour value it is set as 1 it is value of central value will not be lesser than or equal to the neighbour value is set as 0.of 8 binary values will be obtain from the eight closest. After joining the 8 binary values we get a eight bit binary number which will be converted in to decimal

number for our convenience. translated decimal number is known as pixel LBP value and its range is 0-255.
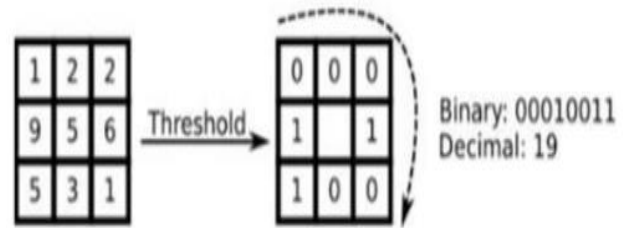

Fig 6: transation of the binary bit to decimal

It was producing the same result by the fixed neighbour and to use different number of radius and neighbour this algorithm is improved. Now it is known as circular LBP this type it uses the bilinear interpolation. This method produces the data points in between the neighbour pixels and assign the arbitrary number of neighbours on the circle on the given radius
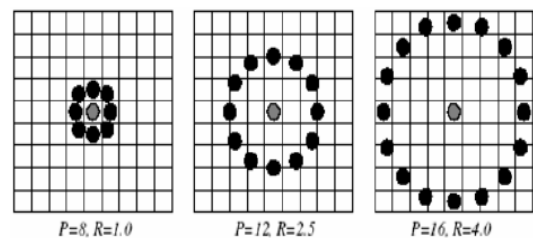

Fig 7: differentiate by data point and circular radius

The position of the neighbour can be calculated using (xp,yp) by the given points (xc,yc)

$$x_p = \qquad x_c + R\cos(\frac{2\pi p}{P})$$

$$y_p = \qquad y_c - R\sin(\frac{2\pi p}{P})$$

in the above calculation R is the radius of the circle and p is the number of sample points

The data points that co-ordinate on the circle will not correspond to image coordinates:

$$f(x,y) \approx \begin{bmatrix} 1-x & x \end{bmatrix} \begin{bmatrix} f(0,0) & f(0,1) \\ f(1,0) & f(1,1) \end{bmatrix} \begin{bmatrix} 1-y \\ y \end{bmatrix}$$

The LBPH face recognition algorithm are likely towards the monotonic gray scale image transformation
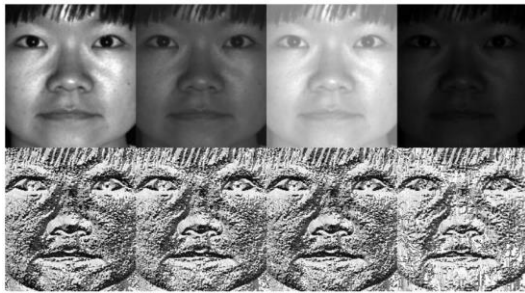
Fig 8: Converting image to greayscale

- After After the generation of local binary pattern value and then histogram of the region is created by counting total number of similar LBP value in one region.When the histogram is created to all region then all histogram will combined to form a single histogram and this is also known as feature vector of the Image.
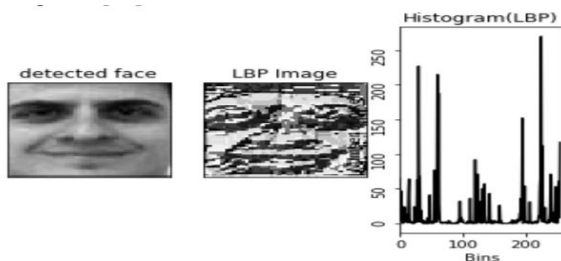

Fig 9:Converting image to histogram

- we compare the histograms of the test image and the images in the database and then we return the image with the closesthitogram. The Euclidean distance is calculated by comparing the test image features with features stored in the dataset. The minimum distance between test and original image gives the matching rate.

$$d(a,b) = \sqrt{\sum_{i=1}^{n} |a_i - b_i|^2}$$

- The final output will be recognized when the id of the image stored in database should matched to tested image.

- LBPH will not be effected by the illumination variations LBPH is more flexible algorithm

3. CONCLUSIONS

The system will provide authentication process with in a nine digit key of the password. And the system will continuously monitor the user authentication process. Camera based authentication process as been incorporated as a new application for the authentication process. This system will provide the three type of security process such as eye-ball authentication process and face detection system and otp generation through this system the users eye blink

will effect the accuracy of detecting pins feature enhancement

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