Eye Blink Detection Using MATLAB

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Abstract-In olden days Face Recognition is very popular for security applications. But security against face spoofing attacks requires the increased attention, such attacks can be easily done by printed photos, video replays and 3D mask of a face. To avoid such things the proposed paper is an "Eye Blink Detection using MATLAB". The proposed method has a low computational complexity and high accuracy such that it is an efficient and effective to run not only on mobile device but also on other platforms. The proposed method detects the movement of an eye ball and the number of eye blinks to improve face recognition. To reduce the risk of securing personal information an eye blinking detection is associated into the system. Using the front camera of the phone and different machine learning algorithms, user's eye movements are being tracked and detected by the mobile phones. Eye Blink detection plays a very important role in the field of human computer interaction. The proposed method has a wide range of application such as object selection, driver drowsiness detection, financial transactions, border and airport control, home or building security military applications, persons with disabilities and so on. Eye blinking detection is hand free interfacing system that removes the gap between the real and electronic world. It is great importance in today's world where implicit commands become more useful and attractive that the explicit on.

Keywords-MATLAB2013; Face Detection; Eye Detection; Eye Blinking Detection.

I.   INTRODUCTION

According to the statistics of Seong won Han [1], As new applied services related to smart mobile devices associated with social network are emerging constantly, in order to prevent non-owner from being able to operate directly the built-in system of mobile device, screen unlock function is gradually applied. However, due to today's social network popularity, some interested people might be able to steal personal data from the network, and this function became easier to be broken. Therefore, in this study, "eye blink" function is associated into the system to make sure that the user in front of the mobile device is the right person instead of a photo so as to protect personal data within the mobile device and to reduce cheating issue from human face.

II.   LITERATURE REVIEW

The aim of this paper [1] is to help people for improvement of the door security of sensitive locations by using face detection and recognition. Face is a complex multidimensional structure and needs enhanced computing techniques for detection and recognition. If a face is recognized, it is authenticated. The door will open automatically for the authenticated person due to the command of the microcontroller.

The paper[2] presents a methodology for recognizing the human face based on the features derived from the image. The proposed methodology is implemented in two stages. Better accuracy in recognition is realized with the proposed method.

The work in [3] is consisting of web camera which placed in a way that it records driver's head movements in order to detect drowsiness. As drowsiness is detected, a signal is issued to alert the driver. The system is implemented using cascade object identifier from vision toolbox of MAT lab, which detects face, eyes, nose and mouth from the image which is captured from web camera.

The work in [4] claims that the face recognition systems in applications from de-duplication to mobile device unlocking, security against face spoofing attacks requires increased attention; such attacks can be easily launched via printed photos, video replays and 3D masks of a face. We address the problem of facial spoof detection against print (photo) and replay (photo or video) attacks based on the analysis of image aliasing (e.g., surface reflection, more pattern, color distortion, ´and shape deformation) in spoof face images (or video frames).

III.   PROPOSED METHOD

A.   System Architecture

In this section, an eye blink technique in association with face recognition is proposed to improve the application of cheating of screen unlocking by a human face. For that eye blink technique is associated into the system. Blinking method [7] did not need any complicated procedure to user identity and the user just blinks his/her eyes to fast unlock the screen on mobile devices. Eye blink detection help in future purpose to store some important information in the mobile phone such as bank information, customer data and photos, etc., Human eyes will complete eye [8] blink action unconsciously or

autonomously within a second. The system architecture can be divided into five blocks, which are respectively face detection, face recognition, face database, eye detection, eye blink detection. The function of each function is described as follows:
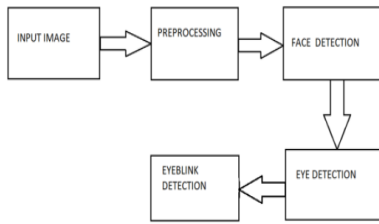

Fig .1: Block Diagram of Proposed method

B.   Face Detection:

The viola-Jones object detection algorithm is the first object detection to provide competitive object detection rates in real time proposed in 2001 by Paul viola and Michael Jones [2]. Although it can be trained to detect a variety of object classes, it was motivated primarily by the problem of face detection. The Viola-Jones algorithm has four stages: They are

1)   Haar feature selection.
2)   Creating an integral image.
3)   Ada boost training.
4)   Cascading classifiers.

Face Detection [3] is the process of locating a face region in an image. The face detection does not care who the person is, just that it is a human face. Face detection [4] is a computer technology used to identify human faces in digital images by determining the location of the faces in the image and extract sub images for each face. It will find a face from the face image with face samples on a face database to achieve user' identification. If she/he is identified, the eye detection will start.

Fig 2: Detection of face

C.   Eye Detection:

Given an arbitrary face image, the goal of eye detection is to determine the location of the eyes. Simply in eye detection, the areas where both eyes are located are found. As a result of this process usually eye areas [6] are indicated by a rectangle. For detecting of eyes from a face we used viola-Jones algorithm.

Fig .3: Face and Eye Detection

D.   Eye Blink Detection:

Our Eye blink [5] algorithm comprises of, Taking eye blink video as a input, converting video into frames. Here we are taking 8sec video as input. Now the video obtains a 290 frames. The obtained frames based on the time consumed by the video. Based on these frames select the three different states (i.e..open state ,closed state and half blink state) i.e.. frame1,frame79, frame192. From the above selected states, it plots the graphs respectively. Based on the plotted graphs determine the threshold values, to show authentication differences between the persons.
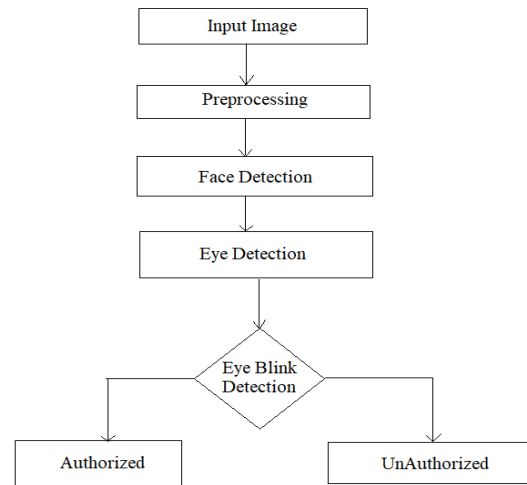

Fig .4: Flow chart for proposed method

Eye blinking can be detected with high reliability. Eye blink detection, which finds eyes through the human face. Eye blink detects the number of eye blinking to improve face recognition for screen unlock on mobile devices.

Blinking method did not need any complicated procedure to user identity and the user just blinks his/her eyes to fast unlock the screen on mobile devices. In a video, we detect an eye blink if several consecutive frames capture the quick motion of closing and opening the eyelids.

E. Closed and open eye detection:

Based on the obtained frames we selected the different states of the eye. The respective frames and graphs are shown below:
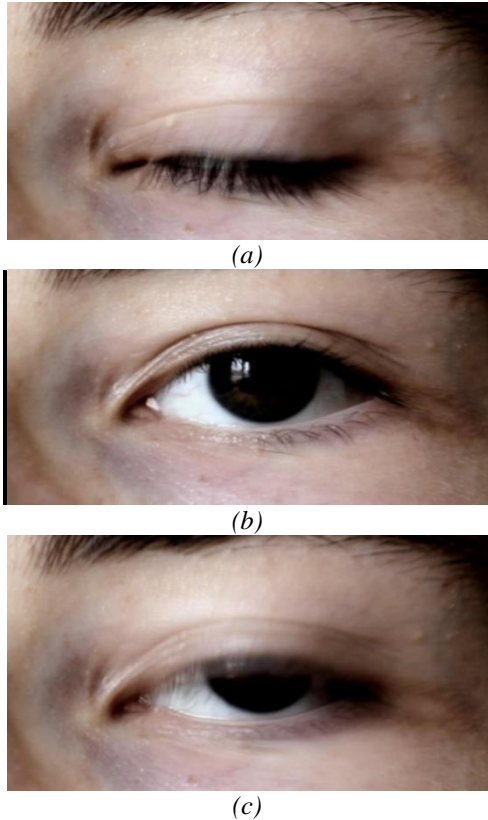

(a)

(b)

(c)

Fig .5: (a) closed eye image (b) open eye image (c) half blink image
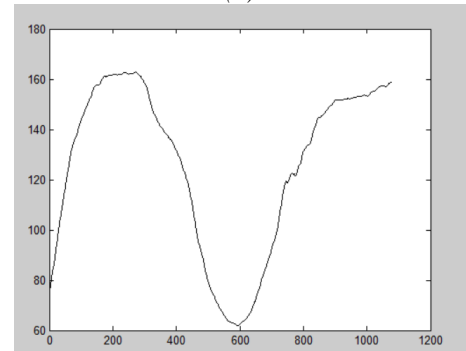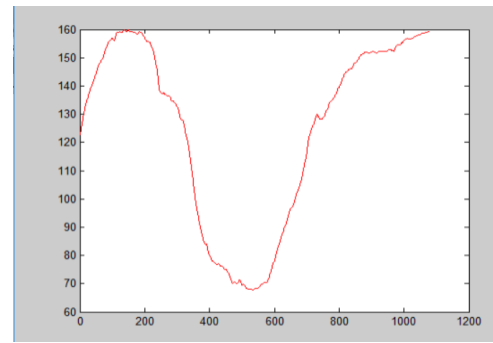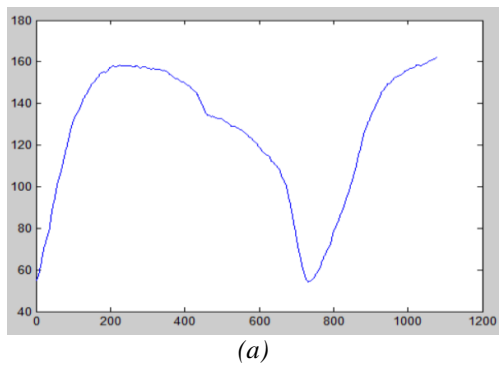

(a)

(b)

(c)

Fig .6: Results for eye blink detection (a) Graph for closed eye (b) Graph for open eye (c) Graph for half blink

If consider three threshold values based on above graphs i.e. y1, y2, y3. If y1>120, y2>54 and y3>74 then it shows as authenticated, otherwise it is unauthenticated. When we give eye blink video as an input it converts into frames and then based on the obtained graphs it compares the graph values with the threshold values given. If the obtained graph values are matched with the threshold values then only it is authenticated, otherwise it is unauthenticated.
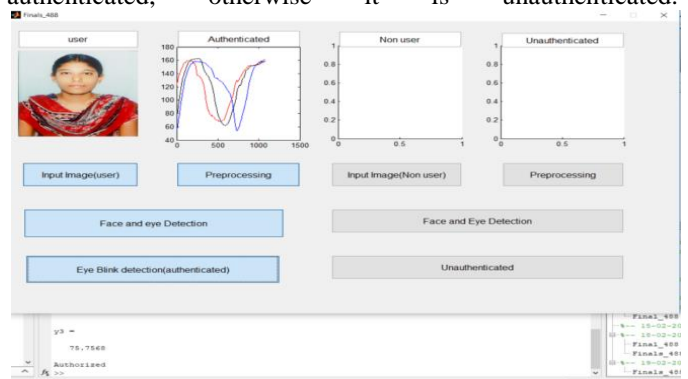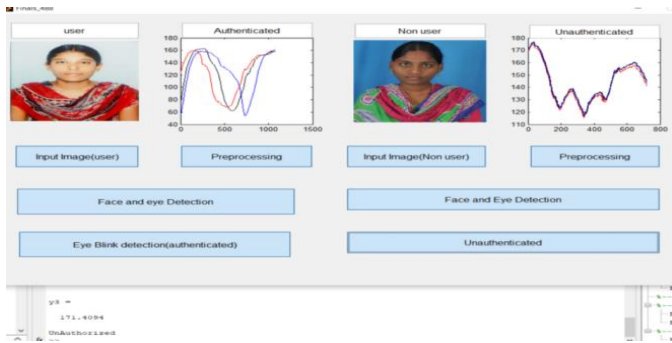

Fig.7: Result for Authentication

Fig.8: Result for unauthentication

IV.   CONCLUSION

Due to the popularity of smart phone, people tend to store some important information in the mobile phone such as bank information, photos, customer data, and subscription information, and so on. However, when the information was stored in the mobile phone; it will need strong protection methods to avoid the theft of related information by others. Face Recognition can be easily cheated by using the color photos of the users on the mobile devices. Therefore, in this paper, the eye blink was proposed to improve the face recognition on mobile screen unlocking. Our method did not need any complicated procedure to authenticate user identity, and the user just blinks his/her eyes to fast unlock the screen on mobile devices.

V.   FUTURE SCOPE

Eye blink detection help in future purpose to store some important information in the mobile phone such as bank information, customer data and photos, etc., by implementing a screen unlock as well as app unlock. The proposed algorithm will also detect eye blink with wearing glasses.

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