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Eye Blink Detection using Adaboost Approach and Morphological Operations

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ABSTRACT: Vision-based facial gesture evaluation implies understanding extraction from an image sequence concerning the pose and motion of the head as well as the expressions of the face which are related to movements of the facial features such as eyes and mouth. Here, we propose a tracking algorithm which is designed to find the positions of the interested regions in image sequence which can ultimately be used to search pose and actions of the eye. The proposed scheme automatically learns specified eye appearances which look strongly related to eye blink detection. For this reason, eye gesture recognition seems to be one other feature of the proposed detection process.

KEYWORDS: CBIR, Gabor and Shape based Features, Improving Precision Priority (IPP), Morphological-based Segmentation.

I. INTRODUCTION

There was a growing interest in the area of facial expression recognition especially in the last two decades. The primary contribution of this work is routinely initializing the eye blink tracking and detection in an image for real time eye blinking and monitoring applications. Monitoring and blinking the eye parameters and detecting eye states is more difficult than simply monitoring and blinking the eye locations for the reason that the eyes occupy a small area of the face. Most eye trackers work good for open eyes. However, blinking is a physiological necessity for humans. In addition, for applications such as facial expression analysis and driver consciousness systems, we need to do more than tracking the areas of the person's eyes but receive their particular description.

We have to recover the state of the eyes (whether they are open or closed), and the parameters of an eye model (e.g. the area and radius of the iris), and the corners and peak of the eye opening. We develop a model based system of tracking eye features that uses convergent tracking techniques and show how it may be used to detect whether or not the eyes are open or closed, and to recover the parameters of the eye model. Eye tracking has received a great deal of attention. As blinking is a physiological necessity for people. Human-computer interplay (HCI) systems may also be enriched by using a facial function tracker.

Face and eye detection is one of the most difficult problems in computer vision area. The goal of this paper is to present eye detection and gaze estimation. With the uptrend of methods based on face and eye detection in lots of unique areas of life in latest years, this subject has received far more awareness by means of academic and industrial area. Many different studies have been performed about face and eye detection. Apart from having many challenging issues like, having distinct lights conditions, having glasses, facial hair or mustache on face, specific orientation pose orocclusion of face, face and eye detection ways performed excellent progress.

There are many procedures introduced in literature focusing on eye tracking. They may be able to be used as a base to improve an eye tracking system approach which achieves the best possible accuracy, satisfactory efficiency and less time consuming. This paper presents one-of-a-kind eye tracking and detection approach. To analyze the movement and tracking of an eye, image processing system has to be employed which treats images as two dimensional signals even as making use of alreadyset signal processing methods. It is a type of signal dispensation wherein input isimage, like video frame body or image and output may be image or its featuresassociated with that image. The images from camera are modified into digital formwhich might be there by greater and carried out some filtering and logic operations onthem, to extract some useful and preferred information.

Eye's and their movements are fundamental in expressing a person's desires, desires and emotional states [1]. Method ofrecording eye role and movements is called oculography. Eye movement supplies a rich and informative windowinto character's thought and intentions. The motion and geometric characteristics of eyes are precise which

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makes pupillocalization, gaze estimation, and eye tracking essential for a many functions equivalent to biometric protection, human attention analysis [4]. For that reason robust eye detection and eye tracking are considered to play a valuable role within the development of Human machine interface, Biometric protection and in vast variety of applications [2]. Eye gaze detection system is normal type of interaction, comprehensive by choosing the place where the person is looking [3]. Eye gaze process is based on computing web camera, enabling a more ordinary form of human machine interface [11]. This eye tracking can be used on computers, smart phones or tablets.

The organization of the paper is as follows. Section II briefly describes the existing techniques used to detect eye blinks. Section III discusses how face detection, eye detection and eyeblink detection are performed. Section IV presents results and discussion on our proposed work. Section V concludes based upon the results.

II. RELATED WORK

In recent years eye blink detection approaches are extensively utilized in human computer interaction (HCI) methods. Eye blink detection systems are very useful for individuals who're unable to control computer systems and digital instruments because of impairment or complete lack of motor functions. Chau et al [1] developed an eye blink detection tracking approach for the paralyzed humans who are unable to move their body parts except their eyes.

This proceduretakes the input from the user's eye blinks, similar to the attention blinkduration to produce a mouse click. Grauman et al [2] additionally usedeye blink features as a source of communication betweenlaptop and human with disabilities.

A simple way of tracking eyes is through template-based correlation. Tracking is performed by correlation maximization of the target model in a search region. Grauman et al. [8] makes use ofhistorical past subtraction and anthropomorphic constraints to initialize a correlation basedtracker. Matsumoto and Zelinsky [9] present trackers based on template matching and stereo cameras. Excellent tracking performance is mentioned, and thesystem requires an entirely calibrated stereo setup and a full facial model for every user.

I. PROPOSED SYSTEM

The algorithm used by the method for detecting and analyzingblinks is initialized automatically, based upon theinevitability of the involuntary blinking of the user. Motion analysis techniques are used in this stage, adopted with the help of on-line construction of a template of the open eye for usefor the sub sequent and template matching that iscarried out at each image. In the proposed work detect the face region using adaboost algorithm then we localized an eye region in the face.

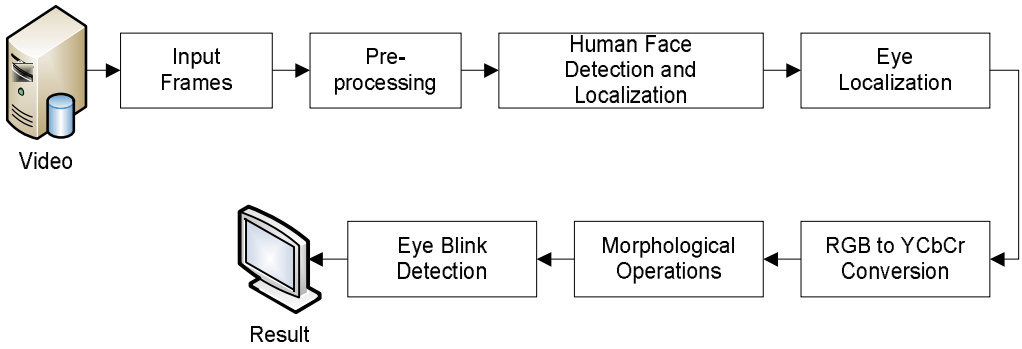

Fig. 1. Proposed Architecture

A. *Pre-processing:*

Pre-processing is a stage where the input video isread and frames were extracted from the video. For the extracted frames apply pre-processing which includes gray color conversion, which means input frames have to be converted to gray color in order for the further processing.

B. *Face Detection:*

The Viola Jones face detector [9] is used as first stage todetect the face. It is an object detection algorithm resulting invery excessive detection rate in real time. It consists of three main steps. First, an intermediate image is introduced in

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the form of imperative image which takes the pixels sum to speed up the feature extraction section as an alternative of making use of rectangle points which are regarded to be slow. Secondly, basic elements are extracted from a massive set utilizing AdaBoost algorithm and results in an awfully accurate classifier. Subsequently, all complicated aspects are combined in a cascaded approach to discard the undesirable regions of the image that results in very accurate facedetection. Viola Jones is implemented within the database and the detected face is proven. The oblong field suggests the neighborhood of the detected face.

From the detected face region, eye part has to be localized in order for the further processing. Eye pair detection is the second step after face detection to detect the eye pairs in face. The localization of eyes in facial images has many applications in computer vision such as gaze estimation, pose estimation, face detection, face recognition, human computer interaction, eye blink detection etc. Eyes can be extracted from facial images using one of a kind eyefeatures such as color, illumination, form, geometry, edges and etc. Once two eye blocks appear from the segmented image and spread to a exact measurement; they will be detected by way of thedecision criterion of eye region. However, often, it is determined that in the detection method the twodetected eyes might not be real eyes, moreover, it is difficult to seek unique centre of eye.Once the eye parts are marked, template is created for that eye mark. Marked image is multiplied with original RGB images. This RGB image is converted to YCbCr plane. By choosing any one plane we willwe will apply morphological operations.

C. Segmentation: Morphological Based

Morphological Operation is a technique for the study and processing of geometrical structure, based on sethypothesis, lattice hypothesis, topology, and arbitraryfunctions. Here we initially convert the image to binary and then we apply dilation, area, height, width based morphological operations are applied.Dilation is one of the two basic operators in the area of mathematical morphology, the opposite being erosion. It's generally used to binary images; however there are versions that work on gray-scale images. The fundamental effort of the operator on a binary image is to progressively amplify the boundaries of regions of foreground pixels (i.e. White pixels, typically). As a result areas of foreground pixels develop in dimension while holes within these regions emerge as smaller. Dilation enables objects to increase, hence potentially filling in small holes and connecting disjoint objects. Erosion shrinks objects by etching away (eroding) their boundaries.

D. Eye Blink Detection: Euclidian Distance

Eye blink can be detected using Euclidian distance approach. A more common measure is Euclidean distance, computedwith the help of finding the square of thedistance between every variable, summing the squares, and calculating the square root of that sum. In the two-variable case, the distance is analogous to finding the length of the hypotenuse in a triangle; that's, it is the distance "as the crow flies." A review of cluster analysis in health psychology research found that the most normal distance measure in published studies in that research area is the Euclidean distance or the squared Euclidean distance.

The Euclidian distance between two point $A(x_1, x_2, \dots, x_n)$ and $B(x_1, x_2, \dots, x_n)$can be calculated using (1)

$$d = \sqrt{\sum_{j=1}^{n} (x_j - y_j)^2} \qquad (1)$$

Deriving the Euclidean distance between two data points involves computing the square root of the sum of the squares of the differences between corresponding values.

II. RESULTS AND DISCUSSION

Below Figuresshow some of the expected results of our proposed work.Figure 2 (a) is the input image and (b) is the respective segmented image.

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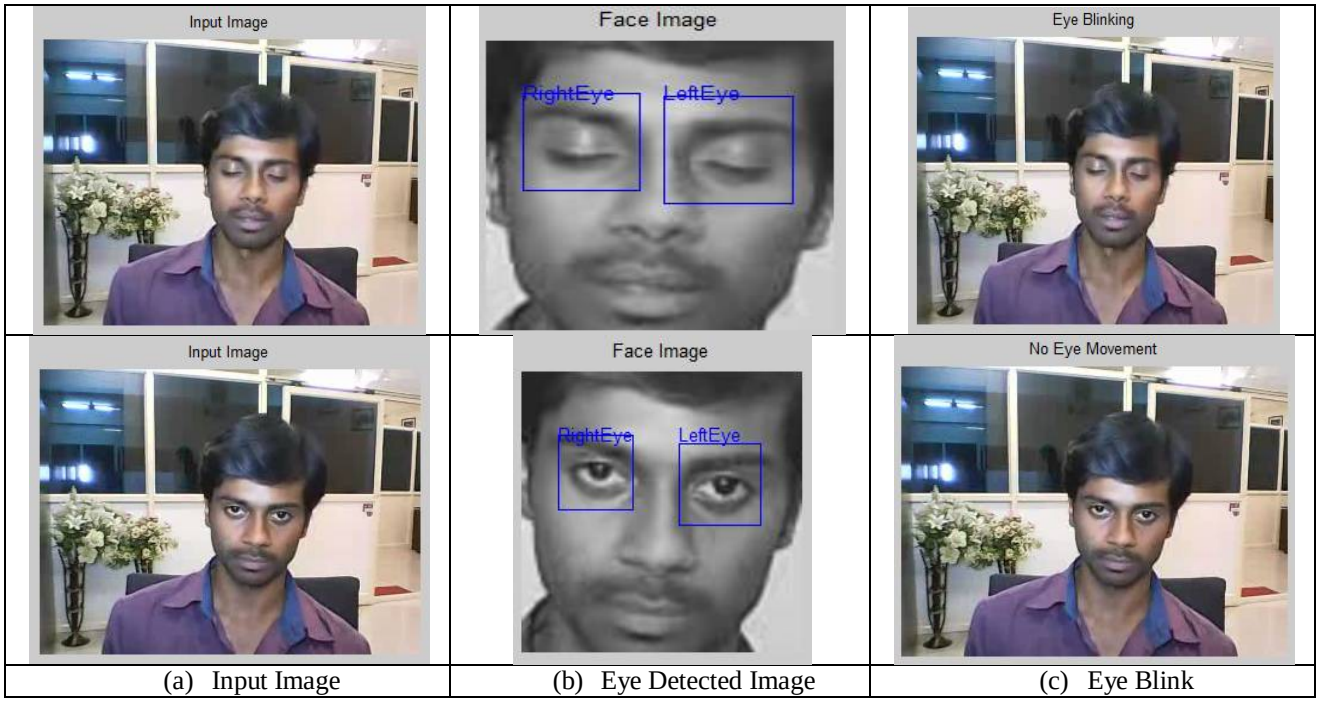

(a) Input Image (b) Eye Detected Image (c) Eye Blink

Fig. 2 Images of Proposed Work

III. CONCLUSION

In this paper we proposed eye detection methodology using multiple enhanced approaches such as voila-Jones algorithm for face detection, morphological operations for segmentation and Euclidian distance approach for eye detection.

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