TRACKING A GAZE USING A METHOD OF EYE LOCALIZATION

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Abstract— **Eye localization and gaze estimation technique was developed in MATLAB.**
This technique is used for unique cases in which user sits in front of camera and laptop. To find the location of the eye in the detection is solved by eye detection technique, but 'black box' eye detection technique have not fulfill the requirements and it requires the gaze-driven interface.In eye detection first step is to segment the sclera and pupil, then find out the centroid of the sclera and pupil. The second step is to estimate the gaze according to the movement of eyes of user i.e where the eyes of the user is looking at.In this paper of eye detection and gaze estimation, to represent the various applications like to detect the fatigueness of driver, to handle the features of the laptop according to the estimated gaze. One more important application of this technique is that handicapped peoples can also operate the computer simply looking at the features of interest.

***Index Terms*—graphical user interface,eye detection,centoid detection,gaze estimation.**

I. INTRODUCTION

From identification of where on the screen a user is looking, substantial value can be obtained. The main aim of our project is developing a technique of eye detection and gaze estimation which is evolved from interest in a novel interface for laptop computers. This interface would offers a user to control the computer through observing the features of interest and expresses action by blinking eyes.
This technology is beneficial for detection of driver fatigueness, surveillance, human computer interaction, advertisement etc.
For example: a driver are driving a car he could safely come to a stop should the driver experience a microsleep. Then the buzzer is ON and give instruction like a drive is fatigueness.In human computer interface for a laptop the grinding technique are used and the indentification of pointer movement and we

want to operate the laptop features in eye movement.In this paper the technique was used and carried out the gaze estimation of a eye.

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II. SYSTEM REVIEW

To use the information from the head area different approaches are used are as follows:
1)Electro-myographic(EMG) signals.
2)Electrooculographic(EOG) Signals.
3)Brain-computer interface(BCIs).
4)Gaze localization.
To track the gaze there are different method but the most appropriate method is video based once that determine the location of eye or pair of eyes either in the remote cameras.Various devices used for the human computer interaction such as:
1)Mouse.
2)Touch Pad.
3)Touch Screen.
4)Gestures.
The main application of our project eye detection and gaze estimation is that to determine that driver is fatigue or not.
Different approaches are used for that which are as follows :
Analysis using EEG signal approaches:
In this technique EEG signals from brain are further processed so as to detect fatiguness of the driver.
To acquire the EEG signal number of electrodes are mounted on the drivers need.EEG signal analysis consist of following approaches:
Using FFT
By finding PSD
Disadvantage of EEG signal analysis
Driver has to wear the cap containing numbering electrode on his head which will make the driver uncomfortable after some time.
System is costly due to the use of electrode.
Due to the drawbacks of EEG signal analysis technique for eye detection and gaze estimation was developed in the MATLAB for the special cases in which user has to seat in front of the camera and computer screen.This technique allows the computer interface that analyze the user input from low effort eye rotation.

III. PROBLEM STATEMENT

The main aim of this paper is detecting the eye; next is to detect the location of eyes in the image and lastly to track the identified eyes in image.then according to the movements of the eyes centroid of sclera and pupil is detected and gaze is estimated.

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IV. SOLUTION

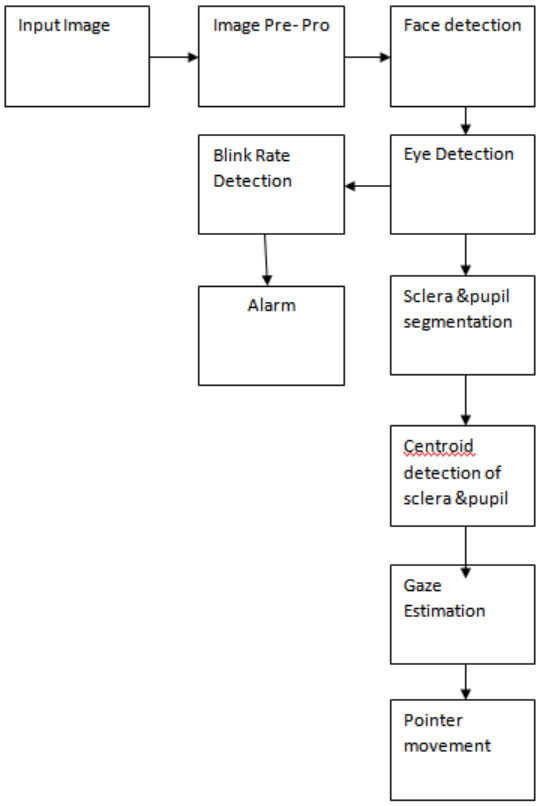

Fig:Block Diagram

METHODOLOGY:

For problem set up we made the assumptions as follows:

The camera is directly faced by the user & which is near to the center of an image.

Then we obtained calibrated image which is looking straight ahead to the camera.

In the calibration image,centroid of the eyes are denoted as 'calibration eyes' & In test image,centroid of eyes are denoted as 'test eyes'.

I Face detection

It deals with recognizing whether there is faces present in given image or not,if it is present then it returns the image orientation & content of each face.This is the primary step of any automatic system that evaluates the information contained in faces.

The merits of this method is that it neglects features which are outside of the facial region are denoted by color features.In this way clothes & hairs will not appeared in the considered region.

II Eye detection

The goal of eye detection is to determine the location of eyes.Whenever an eye is properly illuminated in eye detection technique,it has sharp point of reflection.This point will be denoted as a light dot.Calibration image & chrominance value of its pixels are used for the further processing.

The areas where both of the eyes are located or two eyes individually localized are found in eye detection.In eye detection,eye areas are usually indicated by a rectangle.

Edge detection is the further step in the eye detection.For boundary detection,we used morphological techniques such as dilation & erosion.

III Sclera and pupil detection**:**

The properties of eye image should be measured in any arrangement. It is very difficult to distinguish between iris and pupil from captured image,if the people having dark and dark brown eyes.

If the image is taken from nearer distance, then it can be used to locate the pupil even under the dim lighting conditions. so for this reason,it is necessary to detect iris.

The difference in determining the sclera and pupil is that sclera is more bright than pupil.As the sclera is more lighten and pupil is darker than it,so the boundary formed from it can be easily located and tracked.

IV Gaze estimation:

There are different techniques involved in gaze estimation.The main perspective of this technique is to estimate the gaze i.e to determine the eye,where it is looking at.

The gaze processing mainly focusing relationship between data of the captured image and direction of gaze.

In the captured image user is looking straight ahead to the computer,according to that first of all gaze is estimated for this image.

Suppose the user is looking in the left direction ,centroid of the sclera and pupil shifts to the left direction,gaze is estimated to the left side,in similar way it is estimated for the right side.In this way,according to the movement of eye in different direction the gaze is estimated.

V ALGORITHM

1. Start
2. Image Acquisition
3. Image Processing
    a. Noise Reduction
    b. Histogram Equalization
4. Face Detection Using 'Voila-Jones' Algorithm

5. Eye detection
6. Pupil & Sclera Segmentation
7. Finding Centroids Of Pupil & Sclera
8. Estimation Of gaze from Centroids of pupil & sclera
9. Movement of Mouse Pointer In Respective Grid Based On Gaze
10. Blink Rate Analysis
11. If Behaviour Change Turn On Alarm for Fatigueless
12. Repeat Step 2 to 11
13. Stop

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VI RESULT

Capctured Image

Localizing Face Part

Left Eye Right Eye

Gaze Tracking

Complete Result Window

VII CONCLUSION

In this paper a simple and effect eye detection and gaze estimation method for detecting faces in color image proposed.Face detection is they followed by morphological processing and noise removing technique with the use of webcam the user give the input to the computer using eye movements.And according to this eye movement gaze is estimated.This project convey the simplicity and user friendliness.

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