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CONTROLLING MOUSE EVENTS USING EYE BLINK

Dr.S. Praneetha[*1], Deeksha Mandava[*2], Mohammed Sharmila[*3], Dantanala Akhil[*4].

[#]*PhD, Computer Science &Engineering ,Dhanekula Institute Of Engineering &Technology, Ganguru, India*

[*] *B. Tech, Computer Science &Engineering ,Dhanekula Institute Of Engineering &Technology, Ganguru, India*

[*] *B. Tech, Computer Science &Engineering ,Dhanekula Institute Of Engineering &Technology, Ganguru, India*

[*] *B. Tech, Computer Science &Engineering ,Dhanekula Institute Of Engineering &Technology, Ganguru, India*

***Abstract*— In this paper the proposed system is controlling mouse events using eye blink. This application detects voluntary eye blinks and interprets the commands. In this the eye is identified by using image processing technique like HAAR classifier. The system tracks the computer user eye ball and blinks with a video camera and translates the into movements of mouse events on the computer screen. The interface application is available on line as open source software. In GUI, through image processing the camera detects the pose net points of the eye, tracks the eye ball movement or blinks and processes the mouse events accordingly. This eye tracking technique helps the handicapped people with hand free access. In this application we use eyes instead of input devices. This system tracks the users eye movement with a camera that was focused over user's face and translate them into the movement of mouse cursor on screen and also detect user's eye staring on icon would be treated as click operation on the screen.**

***Index Terms*— Continuous detection of eyes, Detects posenet points of eyes, HAAR Classifier.**

I. INTRODUCTION

Human–Computer Interface (HCI) are often described because the point of communication between the human user and a computer. Commonly used input devices include the following: keyboard, mouse, trackball, touchpad and a touch-screen. of these devices require manual control and cannot be employed by persons impaired in movement capacity. Therefore, there is a requirement for developing alternative methods of communication between human and computer which may be suitable for the persons with motor impairments and would give them the chance to become a neighborhood of the knowledge Society. In recent years, the event of different human computer interfaces are attracting attention of researchers everywhere the globe. Alternative means of interacting for persons who cannot speak ruse their limbs (cases of hemi paresis, ALS, quadriplegia) are their only way of communication with the globe and to get access to education or entertainment. A user-friendly human computer interface for impaired persons should fulfill several conditions: first of all, it should be non contact and avoid specialized equipment, it should feature a real time based performance and it should run on any consumer-grade computer. a vision-based system for detection of voluntary eye-blinks is presented, at the side of its implementation as a Human–Computer Interface for people with disabilities. The system, capable of processing a sequence of face images of small resolution (320 × 240 pixels) with the speed of roughly 30 fps, is made from off-the-shelf components: a consumer-grade personal computer or a laptop and a medium quality webcam.

II. LITERATURE SURVEY

The paper introduces a peculiar idea to control computer mouse cursor movement with human eyes. In this paper, a working of the device has been expressed as to how it helps the limited people share their knowledge with the world . Number of universal manners such as Head and Eye Movement Tracking Systems etc. Prevail for cursor

control by making need of image processing in which light is the primary source. Electro oculo graphy (EOG) is a recent technology to sense eye signals with which the mouse cursor can be managed. The signals recorded using sensors, are amplified, then noise is detached and then digitized, before being carried to PC for software interfacing.

III PROPOSED SYSTEM

In our proposed system the cursor movement of the pc is controlled by using the attention movement in Open CV. The system comprises of webcam and Monitoring Unit. The camera detects the Eyeball movement which was been processed by using Open CV. For operating mouse pointers we can also use the Pyauto GUI library for cursor movement. This system is totally independent system, and all the module will work independently with each other. The individual components used are camera and monitor. For capturing the image normal web camera is employed in our system. Moreover, High resolution HD web camera are often used but it increases the image memory size in MB. So that system take lot of time to read the image and process efficiently as per requirements, and it will also increase the processing time. This system will working under real time data acquisition, data processing and controlling cursor. To detect the precise eye pupil location is extremely challenging. A new image processing technique used for eye pupil center detection and tracking, which works based on open computer vision (Open CV) library. Most of coding part through with the assistance of Open CV library. There is a several algorithms like Haar cascade, Hough transform, edge detection are available for various application. Python language is used for coding for this application, which is user friendly and helpful to resolve the error efficiently. Open CV 3.0.0 library with python is employed during this system.

Advantages of the Proposed System:

1. Hands-free mouse cursor control system.
2. Facilitating the incapacitated to use computers.
3. Mouse pointer control through eye movements.
4. Real time eye tracking and eye gaze estimation is achieved through eye based human computer interaction provide.
5. Simulating mouse functions, performing different mouse functions such as single click, double click and so on using their eyes.

IV SCHEME OF THE PRPOSED SYSTEM

Vision based eye blink monitoring systems has many possible applications, like fatigue monitoring, human computer interfacing, lie detection and etc.. . No matter what the aim of the system is, the developed algorithm must be reliable, stable and add real time in varying lighting conditions. The proposed vision-based system for voluntary eye-blink detection is made from off-the-shelf components: a consumer-grade PC or a laptop and a medium quality webcam. Face images of small resolution (320 × 240 pixels) are processed with the speed of roughly 28 fps.

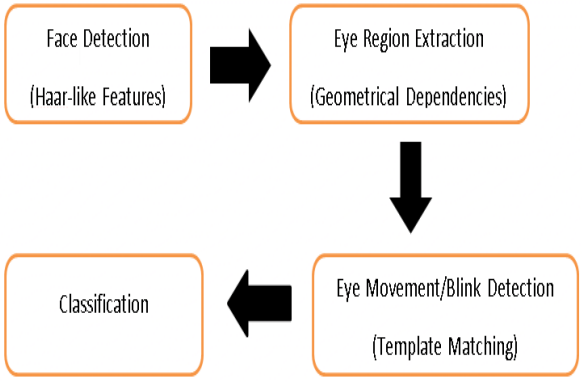
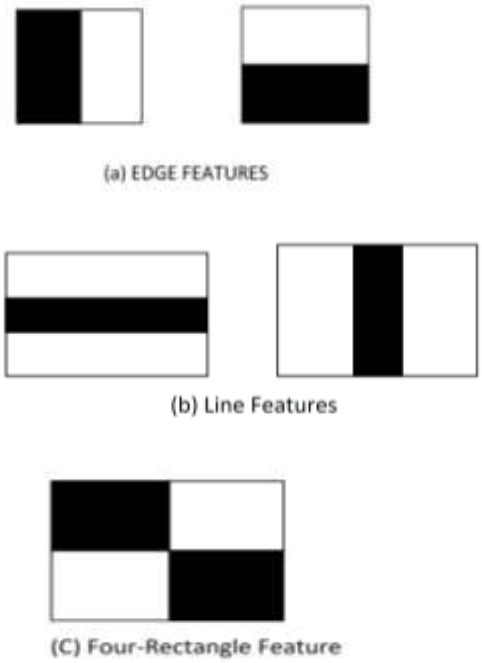


Fig -1: Scheme of the proposed algorithm for eye movement detection.

V. SYSTEM DESIGN

HAAR CASCADE CLASSIFIER: Paul Viola and Michael Jones in their paper “Rapid object detection using boosted cascade of simple features” discussed about the HAAR cascade classifier in the year 2001. A cascade function is used to train lot of positive and negative images. Positive images are the images contain the images which we want our classifier to identify. Negative images are the Images of

everything else, which do not contain the object we want to detect. For the purpose of noise removal HAAR features are used. Different HAAR features are edge features, line features, four rectangle features.



HOG (Histogram of Gradients Algorithm): Now we will take the detected face and extract features from the face using histogram of gradients. For that first we need to find the gradients in the image. We all know that image is a collection of pixels. When we move from left to right pixel by pixel, we will find that after some steps, there is a sudden change in the pixel value i.e, from a black pixel (lower pixel number) to a white pixel (higher pixel number).

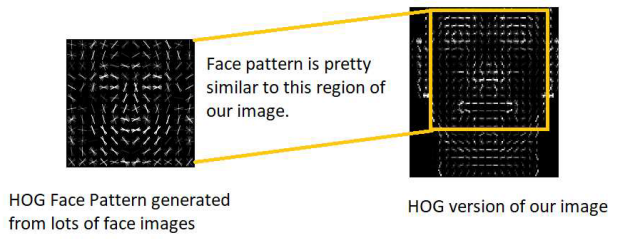


Fig-2 HOG Representation

The position of the image is not always the same. In some images the face of the person may be slightly tilted or only the side portion of the face may be visible. Even in that case also we should be able to recognize the face. For that reason, we wrap each picture so that the eyes and lips are always in the sample place in the image. We will come up with 68 specific points (called *landmarks*) that exist on every face like the top of the chin, the outside edge of each eye, the inner edge of each eyebrow, etc.

Design:

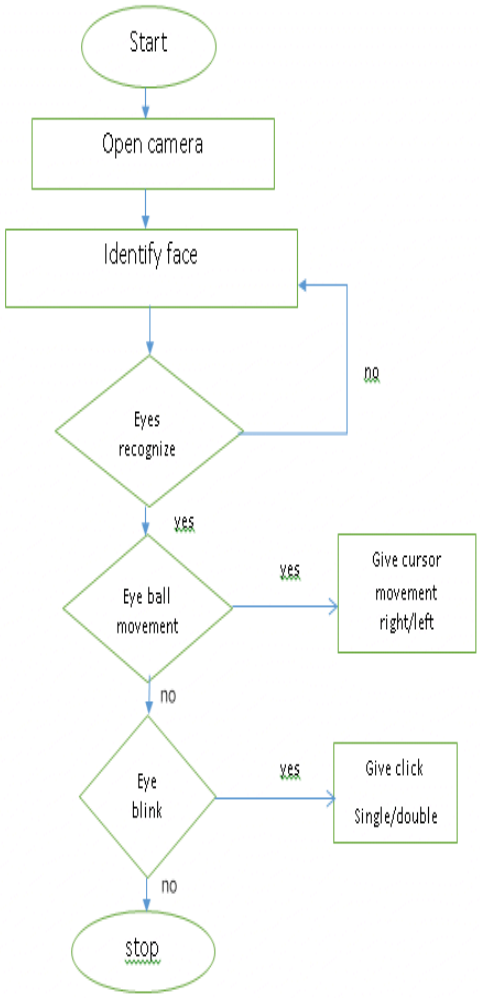


Fig-3: Flow chart

Steps:

Step1:

When we run the code, the camera gets started and will take the input the face will be detected through the algorithm.

Step2:

After getting the face detected .the eye coordinates will be detected which will be having six points for each eye.

Step3:

Whenever the eye ball movement is detected depending on the side which it moves that particular region gets highlighted and cursor movement is done.

Step4:

If the blink gets detected then according to the blink ratio the coordinates are displayed and the particular click is performed.

Step5:

Both the coordinates and the particular event are displayed accordingly.

Step6:

All the above steps are performed based on the algorithms that are used.

Procedure for face landmarks detection:

A training set of labelled facial landmarks on an image. These images are manually labelled specifying specific *(x, y)*-coordinates of regions surrounding each facial structure.. Prior, of more specifically, the probability of distance between them between pairs of input pixels. The end result is a facial landmark detector that can be used to detect facial landmarks in real-time with high quality predictions.

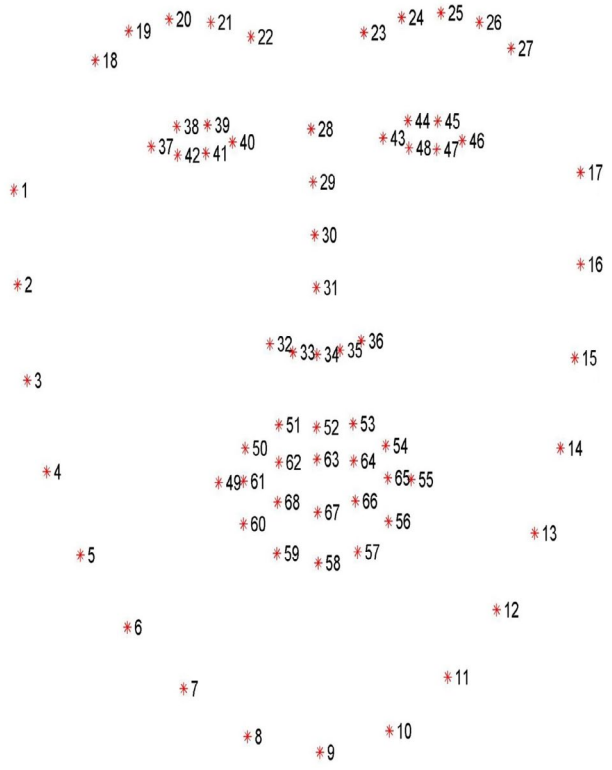


Fig-4: Detecting face landmarks.

VI. OUTPUTS

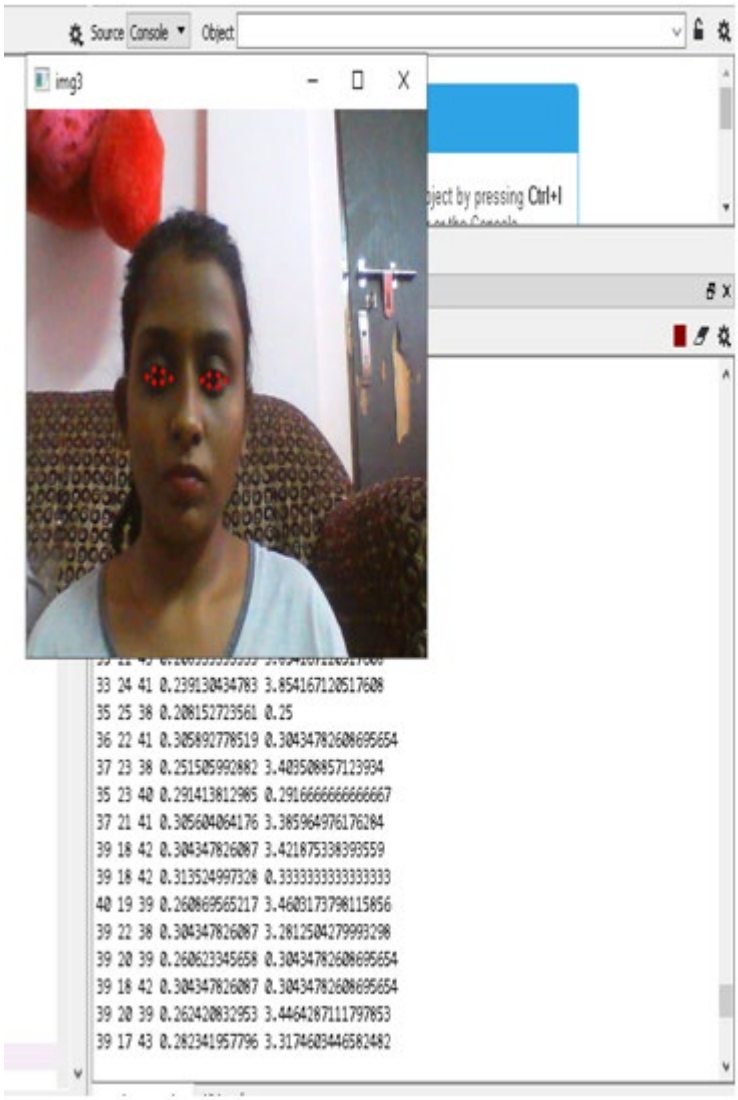


Fig-5: Output with Co-ordinates

In the above diagram, the eyes will be having some coordinates which are from the trained data set through facial landmark detection the coordinates are detected, out of 68 points in facial landmark detection37,38,39,40,41,42 coordinates represent the right eye and 43,44,45,46,47,48 represents the left eye and from them the region is to which eye ball is moved is detected through the RGB colours.

The eye region is been divided into 3 planes left plane consisting of 3 points, right plane consisting of 3 planes and

middle plane consists 4 points, where (37,38,42) coordinates represents right plane (39,40,41) coordinates represents left plane (38,39,42,41) coordinates represents the plane in middle (all these coordinates are for right eye) similarly left eye is considered. when the eye ball moves the plane is detected and accordingly the cursor moves when the eye blink is given, the blink ratio is taken that is horizontal distance divide by vertical distance of the eye when the ratio becomes less it is treated as a blink and corresponding click is been performed.

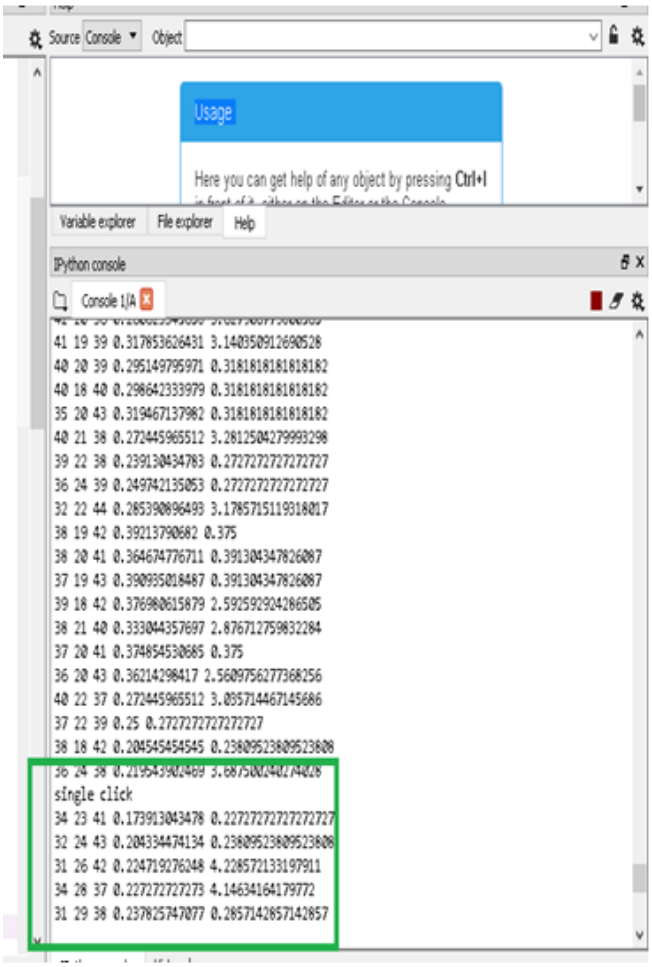


Fig-7 Displays the mouse event performed.

From above figure, we can witness the action that is performed along with the representation of the coordinates, the action is the single click which is been highlighted in the green box .As it is the event of blink the coordinates value reduces because there it displays the blink ratio the values generated will be less.

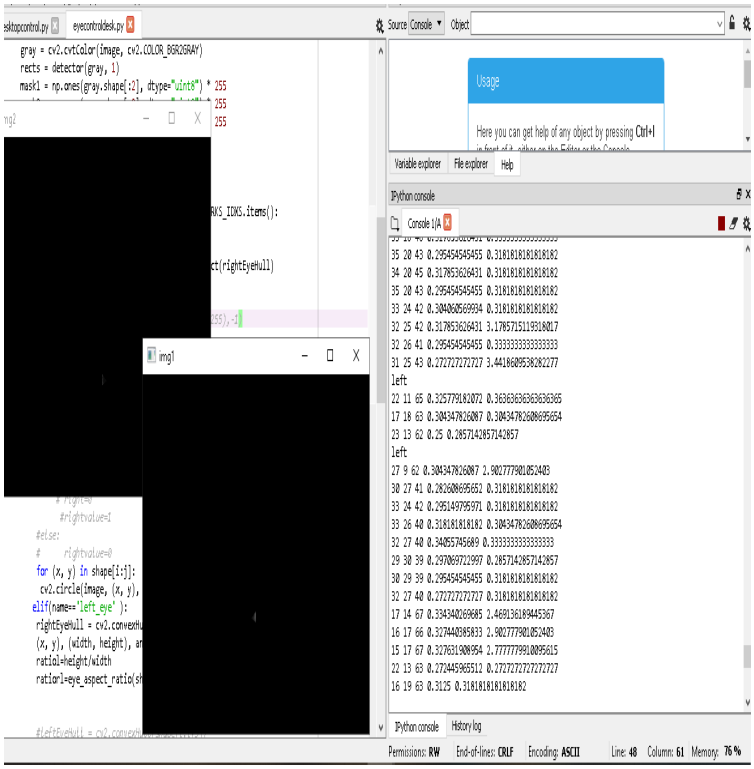


Fig -7: images highligiting eye ball movement

From above figure, we can say There are two images in black color and there is a point which is in white in the image1 the portion becomes much darker in white when the eye ball movement is towards right, in image2 the portion becomes darker in white when eye ball movement is towards left this concept is based on the RGB scaling.

VII. Conclusion

Obtained results show that the proposed algorithm allows for accurate detection of voluntary eye-blinks with the rate of approximately 98%. Performed tests demonstrate that the designed eye-blink controlled user interface is a useful tool for the communication with the machine. The opinions of the users with reduced functioning were enthusiastic. The system was deployed to market as an open-source software.The paper, controlling mouse events using eye movements focuses on the development of hands free computing. The study of various movement based human computer interaction techniques is implemented. Mouse cursor is operated by the eye movement here, Facial landmark detection algorithm is used to implement movement of mouse

pointer and clicking operations are performed. The paper presented above has a very wide future scope as the human computer interaction based software can be very useful in the field of modern technology. Various different scope of this project could be driving cars with the eye movements and operating other digital appliances like Television, Air conditioner with the body movements especially designed for people with disabilities this project extension leads to best discoveries in future and has good scope and highly recommended in future.

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