



Mouse Pointer Controlling - Using Eye For Pwd's

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Abstract:

Large numbers of input devices are available for human interaction with modern computer systems which are operated by hands and a few of them through gestures made using fingers and body movements. The advancements in assistive technology have proposed many concepts for controlling the input and mouse movements by detecting the basic eye movements of a user with the help of the eye tracking systems. We place our focus on the implementation of the computer mouse which is designed to detect the relative position of the cornea with respect to the initially calibrated centre and calculate the attributes like angle and speed at which the movement of mouse cursor has to be initiated.

Keywords

Input devices, eye movement, angle, speed.

1. Introduction

The "Mouse Pointer Controlling - Using Eye For Pwds" challenge is a research based venture. Eye gaze detection and monitoring turn out to be a growing hobby in developing herbal interplay among human and pc. Eye monitoring machine use "eye mouse" to provide computer get entry to for human beings with excessive disabilities. The human beings with numerous disabilities can not revel in all the centers provided by computer. This technology is meant to replace the traditional computer screen pointing gadgets for using disabled or a brand new way to engage with mouse. This research project includes some steps follows-face detection, eye detection, eye monitoring. The project we describe is real time, on- intrusive, rapid and inexpensive technique for tracking facial features. This technological concept is successful to put off and update the unique interface that is the pc mouse or we will say conventional mouse with the human eyes, as a new manner to have interaction with computer. This includes handiest personal laptop and

an built in webcam to control mouse motion in order for manipulating the laptop. sadly, humans with physical disabilities (visible, auditory, physical, and so on.) cannot experience blessings provided with the aid of computer systems. but this approach is useful for the handicap human beings. This paper gift hands loose interface between human and computer. This eye tracking mouse allow the intense disabilities humans to use their eye motion to perform some operation. In the closing (last) decade, the development of eye tracking (ET) systems represented a venture for researchers and one of a kind groups inside the area of IT, scientific system or multimedia industrial gadgets. An eye tracking system is based on a device to track the movement of the eyes to know exactly where the person is looking and for how long. It additionally entails software program algorithms for pupil detection, photograph processing, facts filtering and recording eye movement through fixation point, fixation period and saccade as properly. A massive style of hardware (If required) and software strategies have been applied with the aid of studies organizations or businesses according to technological progress. The ideal devices for eye movement acquiring and software algorithms are chosen in concordance with the utility necessities. a few companies (e.g. SensoMotoric instruments, Tobii or MyGaze etc) have invested in eye monitoring era, but their solutions are targeted on industrial faraway camera-based eye-tracker structures for which the light supply and digital camera are completely affixed to a display(monitring). Because those business systems inclusive of software and aid are costly some mobile and low-cost gadgets for eye monitoring have been advanced via some research corporations. the attention monitoring programs covers human computer interaction, brain PC interaction, associative era, e-mastering, psychology investigation, pilot training help, virtual and augmented reality and so on. As we know that 'with the launch of Digital India programme, the government is taking a big step forward to transform the country into a digitally empowered knowledge economy'. The programme includes projects that aim



to ensure that government services are available to citizens electronically and people get benefit of the latest information and communication technology. To give access of all facilities to people government going to take several steps by organizing various programs and schemes, event etc, So that people become able to take advantages of all facilities and enjoy their life. So why, PWD's (People with Disabilities) are away from this precious and life changing events, programme. To keep such people participation in Digital India program, trying to contribute or help pwds to be part of our nation dream project. Because their active participation is also must and necessary in upcoming days. For that in this project going to use some techniques like face detection, eye detection and all. As this techniques and their algorithms are easy to listen but as that much it is hard to implement, because its related to multiple image frames, so will try to do best of my work in that, by studying and analyze all its parameters and small attributes and required tools (if required) to solve the trickiness of such technology to having accurate output of mouse controlling by eye. This project is working on the eye movement by focusing on eye. This eye tracking mouse allow the severe disabilities people to use their eye movement to perform some operation.

2. Methodology

In this project basically four methodologies are used such as face detection, eye detection, pupil detection and finally eye tracking.

2.1. Face Detection

Face detection is the process of properly detecting the correct dimensions of face of the user in the screen using Web Camera. Face Detection can be categorized into two types : Feature-Based Method and Image-Based Method

2.1.1. Feature-Based Method

The first involves finding facial features (e.g. noses, eye brows, lips, eye pupils) and in order to verify their authenticity performs by geometrical analysis of their locations, areas and distances from each other. This analysis will lead to localization of the face and its features. The feature-based analysis is known for its pixel-accuracy, features localization and speed, on the other hand it has lack of robustness.

2.1.2. Image-Based Method

The second method is based on scanning the image of interest with a window that looks for faces at all scales and locations. This category of face detection implies pattern recognition, and achieves it

with simple methods such as template matching or with more advanced techniques such as neural networks and support vector machines. Before over viewing the face detection algorithm we applied in this work here is an explanation of some of the idioms that are related to it.

2.2. Eye Detection

Human eye is an organ that senses light. After face is detected we need to focus on detecting eye. For this SSR Filter is used. SSR stands for Six Segmented Rectangular Filter. In SSR, a rectangle is scanned throughout the input image. The rectangle is then segmented into six segments as shown in Figure 1. This SSR filter is used to detect the Between-the-Eyes [BTE] depending on two characteristic of face geometry. We denote the total sum of pixel value of each segment (S1-S6). The proposed SSR filter is used to detect the Between-the-Eyes [BTE] based on two characteristics of face geometry



Figure 1. SSR Filter

2.3. Pupil Detection

In this stage, the movement of eye pupil is tracked. The key point of eye tracking mouse application is the pupil detection algorithm is used. This is a hybrid algorithm because it uses two main approaches: model-based and feature-based. The algorithm starts by detection and removal of corneal reflection. Next step is to find candidate feature points (located on pupil contour) and then RANSAC (RANdom SAmple Consensus) algorithm is applied to find feature point consensus set. Those points are used to find best fitting ellipse for pupil curve.

2.4. Eye Tracking

This is the final stage of this process in which cursor of mouse is actually moved in different directions with the help of movement of eye pupils. It uses the image of pupils in black and white format so that reflection can be avoided. After, the



movement of eye is been tracked. If a single blink was detected, the tracking process of the single blind will work as a single click.

3. Packages used in Project

The project is being prepared using .NET and we are using different libraries for Image processing.

Following are the packages used in our project: EmugaCV, OpenCV.

3.1. EmugaCV

EmugaCV is an open source library which uses OpenCV library as an library as an basis of Image Processing. It works by allowing OpenCV as an basic functions and functioning to be called by any .NET languages. EmugaCV is written in C# and is highly portable and it is supported on Windows, Mac and Linux operating system.

3.2. OpenCV

OpenCV is a library using which real-time computer vision application can be developed. It mainly concentrate on image processing, video capture and analysis including features like face detection and object detection. The Imgcodecs class provides methods to read and write images. Using OpenCV, the image can be read and it can be stored in the form of matrix. The read() method is used to read an image using OpenCV. Syntax for reading image is "**imread(filename)**".

4. Starburst Algorithm

Starburst algorithm combines model-based and feature-based methodology to achieve a good balance between the run-time performance and accuracy for dark-pupil infrared illumination. This algorithm helps to extract the exact location of the pupil center and also the corneal reflection so that the vector difference between the measures to coordinates can be related in the scene image. Different steps perform while implementing the Starburst algorithm is "Noise Reduction", "Corneal reflection detection, localization and removal", "Pupil contour detection", "Ellipse Fitting", "Model Based optimization" and "Homographic mapping and calibration".

Starburst Algorithm is more accurate than other methods like "pure feature-based approaches". It significantly consumes less time than pure model-based approaches.

5. References

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