Facial Movements Based Mouse Cursor Control For Physically Disabled Individuals

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ABSTRACT -Physically disabled people are an important part of our society who has not yet received the same opportunities of inclusion as others in the Society. Therefore, it is necessary to develop easily accessible systems to achieve their inclusion within the new technologies. The objective of this project is to draw disabled people nearer to new technologies. In this project the assistive multimodal system is presented, which is aimed for the disabled people. The group of users of this system is people with hand disabilities. The interaction between a user and a machine is performed by the algorithm, enables physically disabled individuals to control the computer cursor movement to the left, right, up and down with the help of facial movements. This algorithm employs a Haar-features based approach for object detection. The algorithm also enables the person to open and close

folders, files and applications through a clicking mechanism. It gives the opportunity for disabled people to carry out a work with Personal computer.

Keywords: Object detection algorithm, machine learning.

1.INTRODUCTION

Recently there has been a growing interest in developing natural interaction between human and computer. Several studies for human-computer interaction in universal computing are introduced. The vision-based interface technique extracts motion information without any high-cost equipment from an input video image. However, to develop a vision-based multimodal human computer interface system, an eye, mouth, face tracking and their recognition is done. Many people nowadays are falling victim to diseases that impair them physically, like Paraplegia, as a result of which the person is unable to use his body from neck down. The only organ that can generate different actions is their eyes. In 7 billion population, the total of 518 million people reported having a disability in Census 2011. Currently, in Feb 7, 2018, around 10% (about 650 million) of the world's population individuals live with disabilities. Even when it comes to eating, they need help from another individual to feed them. These individuals need assistance for their day-to-day activities. Currently, individuals with disabilities usually type on the computer keyboard by holding long sticks in their mouth. The technique that we present, will help handicaps to be independent in their lives. It will give them a chance to entertain, socialize and work in their lives.

The proposed work includes face detection, face tracking, eye-blink detection, mouth movements and interpretation of a sequence of blinks in real time to control a non-intrusive human–computer interface.To replace the traditional mouse with the human face and eye movements to interact the computer. It is to assist the physically challenged persons without hands to use the computer efficiently and also easy. In this project we use the webcam which is used to measure the eye movements and its positions which is the process of motion or measuring of the eye the point of gaze. By this, movements of our eyes can be captured and used as signals to control and enable people to interact with the computer just by using our eyes. This is a simple solution for physically disabled people using eye tracking. All we need is a computer or laptop with a web cam pre-installed built-in web-cam in laptop or Personal Computer.

2.EXPERMENTAL

Web Cam

A webcam is a video camera that feeds its image in real time to a computer or computer network. It is a hardware device that inputs images of the User and supplies it to the frame grabber. Just like a digital camera, it captures light through a small lens at the front using a tiny grid of light-detectors that converts the picture in front of the camera into digital format. Unlike a digital camera, a webcam has no built-in memory chip. Hence, it transmits them immediately to a computer.

Desktop

Most of the processing takes place on the desktop. It only has to display the image received from the web camera and provide display to the user. It has the following components:

Frame Grabber

A frame grabber is an electronic device that captures individual, digital still frames from an analog video signal or a digital video stream. It is usually employed as a component of a computer vision system, in which video frames are captured in digital form and then displayed, stored or transmitted in raw or compressed digital form.

Mouse pointer

The mouse cursor, or mouse arrow, or mouse pointer is often shaped like an arrow or a small hand with the index finger pointing towards the top of the display device. The mouse pointer moves as the user moves his or her head and blinking of eyes trigger clicking events.

Object Detection Algorithm

Object detection algorithm has been witnessing a rapid revolutionary change in the field of computer vision. Its involvement in the combination of object classification as well as object localization makes it one of the most challenging topics in the domain of computer vision. In simple words, the goal of this detection technique is to determine where objects are located in a

given image called as object localization and which category each object belongs to, that is called as object classification.

Haar-Like Features Based Approach

Haar-like features are digital image features used in object recognition. They owe their name to their intuitive similarity with Haar wavelets and were used in the first real-time face detector. Historically, working with only image intensities (i.e., the RGB pixel values at each and every pixel of image) made the task of feature calculation computationally expensive. A publication by Papa Georgiou et al. discussed working with an alternate feature set based on Haar wavelets instead of the usual image intensities. Paul Viola and Michael Jones adapted the idea of using Haar wavelets and developed the so-called Haar-like features. A Haar-like feature considers adjacent rectangular regions at a specific location in a detection window, sums up the pixel intensities in each region and calculates the difference between these sums. This difference is then used to categorize subsections of an image.

3.EXISTING APPROACHES AND DRAWBACKS

The previous systems used complex algorithms. They were based on the biometric identification techniques. Some needed to mount devices on the user like Lasers which was not feasible. Hence, our aim is to devise an application that will be cost effective and not be dependent on the biometrics but on the feature classifications of the user.It should use less hardware and simpler algorithms. The objective is to use such a system that will help the upper limb disabled who cannot use the traditional mouse or keyboard. The existing system is limited to the biometric identification. To enhance this, we have used the feature classification method. There are certain problems in existing system as follows:

1 **Mounting devices**: These systems needed a mounted device like lasers or cameras on the user which became tedious.

2 **Biometric identification**: The system used biometric identification for which the users had to register themselves before using the system. It wasn't open for all which has been rectified by the proposed application.

3 **Complex algorithms**: The previous systems used many complex algorithms that needed a lot of calculations to be done depending on various markers

4 .RESULTS ANDDISCUSSION

This project is to provide hands free cursor control which reduces the dependency on mouse we mainly focused on physically disabled persons who cannot use they hands to operate the system. doesn't perform well in poor lightening environment. A feature describing head-posture should even be introduced, it will enable the user to maneuverer freely whereas interacting with system. Introducing the face and eye movement to control the mouse is very useful as a result of it'll improve interaction with the system drastically. The system inputs the video frames from the user. The video is pre-processed for enhancement. In this process the noise and the blurriness of the video is handled and the video is divided into some frames and the face detection is carried out using the object detection algorithm. The procedure for further mouse pointer control will be done as follows

- Video stream will be captured through the webcam.
- The video input will be broken into frames.
- The frames captured will be in RGB mode. These frames will be converted to grayscale as the further processing will be
- easier using the grayscale conversion.
- The frames focusing the eyes are used for the detection of the corners of eye.
- The eye point is calculated and the mouse will move from one position to another based on the movements of this eye point.

Advantages

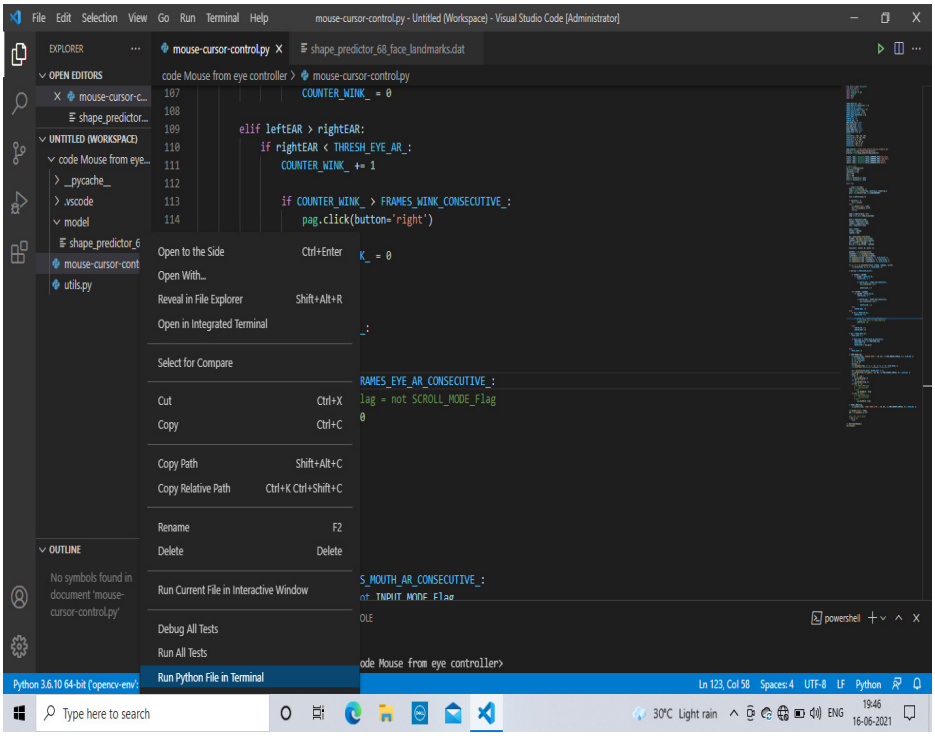
- Hands-free mouse cursor control system.
- Facilitating the incapacitated to use computers.
- Mouse pointer control through face movements.
- Real time eye tracking and eye gaze estimation is achieved through eye based human computer interaction provide.
- Simulating mouse functions, performing different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

5 .EXECUTION PROCESS

The different execution process includes different steps like installing and downloading the required softwares, Running the model, Reading the input, Output.

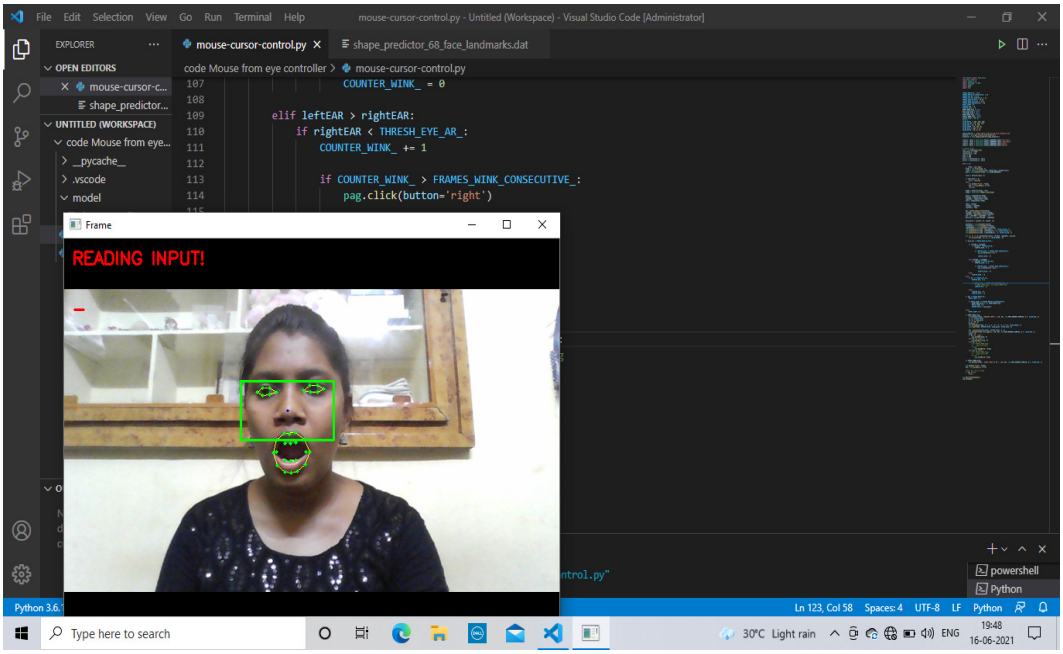
RUNNING THE MODEL

The below figure is related to running of a system. In the left side of the screen, you can find different options in those you need to select mouse-cursor-control and right click on it and then u will find multiple options on the screen again now you need to click on Run python file in terminal option in order to execute.



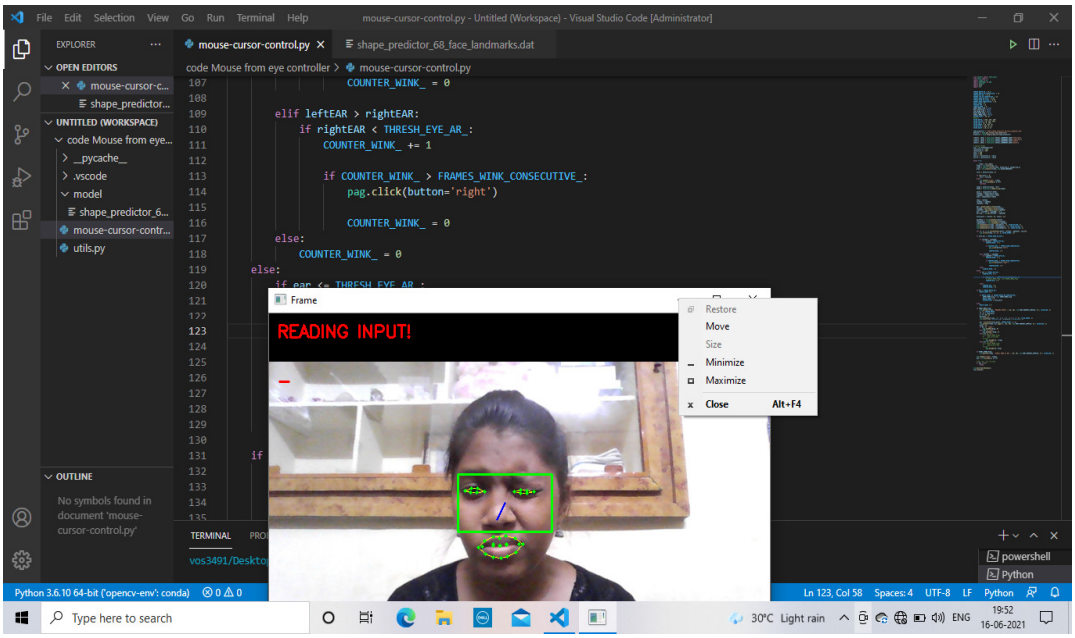
READING THE INPUT

As soon as you click on run python file in terminal the system gets loaded and the output window will be appeared now you can open your mouth to activate the mouse. The below figure shows how the system is going to read the input.



OUTPUT

The below figure shows how the cursor is performing actions depending on your face and facial movements.



6 .CONCLUSION

We have implemented a system to access the mouse pointer on the computer screen using only facial features. With the use of a camera and python technology, the system architecture is prepared. User is able to view head and eye movements captured through

the camera which is displayed on the screen; accordingly, the user can move the mouse pointer as needed and also perform various mouse actions. The proposed system is feature based thus allowing any user to use the system without prior registration. This system is especially useful for the upper limb disabled. Currently, we are extending our implementation to support keyboard press technology for the ease of the User to use the Keyboard hands free along with the already existing mouse movements provided by the system. This would then enable the User to access the computer owing to only facial features and movements without the use of traditional mouse and keyboard i.e. Hands free system. The usability of the system is very high, especially for its use with desktop applications. It exhibits accuracy and speed, which are sufficient for many real time applications and which allow handicapped users to enjoy many computing activities.

7 . REFERENCES

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