



SURVEY ON GESTURE BASED VIRTUAL MOUSE AND KEYBOARD

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Abstract: Computer vision has presently advanced to the point where a computer can recognize its proprietor employing an essential picture handling calculation. Individuals are utilizing this vision in many parts of way of life at this point of improvement, such as confront acknowledgment, color location, automatic driving, and so on. Computer vision is utilized in this extend to form a virtual mouse and console that employments confront and hand motions.

The computer's camera will scan the image of various gestures made by a person's hand and eye movement, and the mouse or pointer will move in response to the movement of the movements, even doing right and left clicks using distinct gestures. Additionally, diverse signals can be utilized to control the console, such as a one-finger motion to select an alphabet and a four-figure motion to swipe cleared out and right. With no wires or other devices, it'll work as a virtual mouse and console. The project's main piece of equipment is a webcam, and the coding is done in Python using Anaconda environment.

Index Terms - Computer vision, gesture recognition, hand/face detection, virtual mouse and keyboard.

I. INTRODUCTION

Image processing is a subtype of signal processing that takes an image or video as input and outputs it as an image or a set of parameters. Gesture tracking and recognition is a type of image processing. A number of gesture recognition systems have been presented in recent years. Motion capture, human-computer interaction, and human behavior analysis are just a few of the uses for hand tracking. This paper describes the development and analysis of real-time finger tracking when making a gesture, such that gestures can be used in a variety of mouse/keyboard-related applications.

When the pc webcam captures the footage of the person sitting before of the pc, a tiny low green box will appear within the center of the screen. The objects displayed therein green box are going to be processed by the code and matched with it. If it matches, a red border will appear, indicating that the pc has recognized the item which the mouse pointer may be moved by moving the thing. this may aid not only in computer security but also within the construction of a virtual computational experience. within the place of assorted objects, hand gestures are going to be wont to move the cursor, a unique gesture are used for right click, and a special gesture are going to be used for left click, and similarly, an easy gesture can do the keyboard functions virtually that are done on a physical keyboard. If the gesture doesn't match, the box will display merely a green box; however, if the recognized gesture is observed, the box will display a red border. In computing terms, a mouse may be a pointing device that detects two-dimensional movements relative to a surface. This movement is translated into the movement of a pointer on a screen, allowing the user to manage the Graphical User Interface (GUI) on a computer.

Similarly, a keyboard is one in all the foremost used computer input devices. A keyboard, like an electrical typewriter, is formed of buttons that are accustomed create letters, numbers, and symbols, yet as execute other functions. There are several varieties of mouse and keyboards that have already existed in modern technology. There's the mechanical mouse, which uses a firm rubber ball that rolls around because the mouse is moved to detect movement. Years later, the optical mouse was introduced, which replaced the India rubber ball with an LED sensor that detects tabletop movement then delivers the information to the pc to be processed. The laser mouse was launched in 2004 to extend the accuracy of movement with the tiniest hand movement. It overcame the restrictions of the optical mouse, including the shortcoming to trace high-gloss surfaces. The soft silicone used to make the flexible keyboard protects it from a variety of contaminants. If you use the keyboard near wet spaces, for example, the silicone skin provides great spill protection. Ergonomic keyboards are keyboards that are designed to improve your body posture. Rather than adapting yourself to fit the keyboard, it is meant to fit you comfortably, making it easy to use and reducing strain.

However, irrespective of how precise the mouse and keyboards are, there are still physical and technical restrictions within themselves. A mouse, for instance, may be a consumable hardware device because it requires replacement over time, either because the mouse buttons have degraded and produce improper clicks, or because the complete mouse isn't any longer detected by the pc. the identical scenario happens with the keyboards too.

II. RELATED RESEARCH

Insight technology may be a gesture based wearable interface that links the digital information around us with the physical world and it allows us to use our natural hand gestures to speak or interact with the digital information. Several approaches are presented on the concept of virtual mouse with different ideas. The approaches were exhausted which involved the concept of Image Processing and Image Acquisition. in keeping with the study, the motto is to create a virtual mouse which is especially useful for saving manual work [1].

This technique proposes the imaginary keyboard (I-Keyboard) together with the deep-learning (DL)-based decoding algorithm to tackle the restrictions of sappy keyboards. First, the proposed I-Keyboard is invisible, which maximizes the utility of the screens on mobile devices. The users can view the content of an application fully screen and sort freely at the identical time. To further improve usability, I-Keyboard doesn't have a predefined layout, shape, or size of keys. The users can start typing on any position at any angle on touch screens without fear about the keyboard position and shape [4].

This method is detects the fingers, identify the gestures and to regulate the operations of a mouse. This paper consists of three sub-sections namely color identification, gesture identification and virtual mouse control together with the system description. this method uses the Python language for the implementation of algorithm. It uses the OpenCV library for image processing and pyautogui library for mouse control. The algorithm uses two forms of methods for implementation of mouse control. One includes the usage of color caps and other uses the popularity of bare hand gesture recognition [5].

There are many approaches handy gesture recognition and every approach has its strength and weaknesses. This survey paper has provided a comprehensive overview of varied hand gesture recognition approaches. this system has reviewed several existing methods for supporting vision-based human-computer interaction supported the popularity of hand gestures like data glove-based method. Vision based method and colored glove method. There are many hand gesture recognition applications are available [10].

This method is implemented in Python programming language using the pc Vision based library OpenCV. this technique has the potential to interchange the standard mouse and therefore the remote controller of machines. the sole barrier is that the lighting condition. That's why the system still can't be enough to exchange the normal mouse as most of the computers are employed in poor lighting conditions.

This technique utilizes of the body gesture, rather than mouse and keyboard, as an interface to browse the exhibited multimedia video contents. For real applications, this technique has defined some control modes, which are supported human natural movements, to construct the commands of interactivities. These commands controlled a body gesture, are often built to regulate a video game system for enhancing user's experiences of exhibitions. In demo system, this body gesture offers a more nature and intuitive interface for the users, who easily rehearse a virtual environment, which is formed by specific work of art generated by graph engines. The proposed system can help the viewers to get more information about those paintings such system can enhance their exploration experiences in touring multimedia contents [7].

III. PROPOSED – METHOD

Object detection may be an engineering that deals with finding occurrences of objects in photos and videos and is connected to computer vision, image processing, and deep learning. during this system, something called "Haar Cascades" is employed to detect objects. it is a machine-learning approach during which a cascade function is learned employing a sizable amount of positive and negative photos. After then, it's utilized to search out items in other photos.

Haar cascades have variety of benefits, one amongst which is their speed. to coach the classifier, the tactic requires an outsized number of positive images (images of faces) and negative images (images without faces). After that, features are extracted from it. They're really like our convolutional kernel. Each feature may be a single value produced by subtracting the overall of pixels within the white and black rectangles. instead of computing at each pixel, it divides the screen into sub-rectangles and creates array references for every of them. The Haar features are then computed using them. it is vital to notice that while doing object detection, practically all of the Haar characteristics are meaningless because the sole features that matter are those of the article. However, Adaboost helps to settle on the best characteristics from many thousands of Haar features to represent an object. The system uses haar cascades with OpenCV. A repository of pre-trained Haar cascades is maintained by the OpenCV library. the bulk of those Haar cascades are utilised for one among two purposes: Face detection, Eye detection, Mouth detection, Full/partial body detection.

To implement mouse events, mediapipe library is employed. MediaPipe may be a framework for creating machine learning pipelines for time-series data like video and audio. For keyboard implementation, CVzone library in python is employed. CVzone could be a computer vision application that produces image processing and AI operations simple to use. it's built round the OpenCV and Mediapipe libraries.

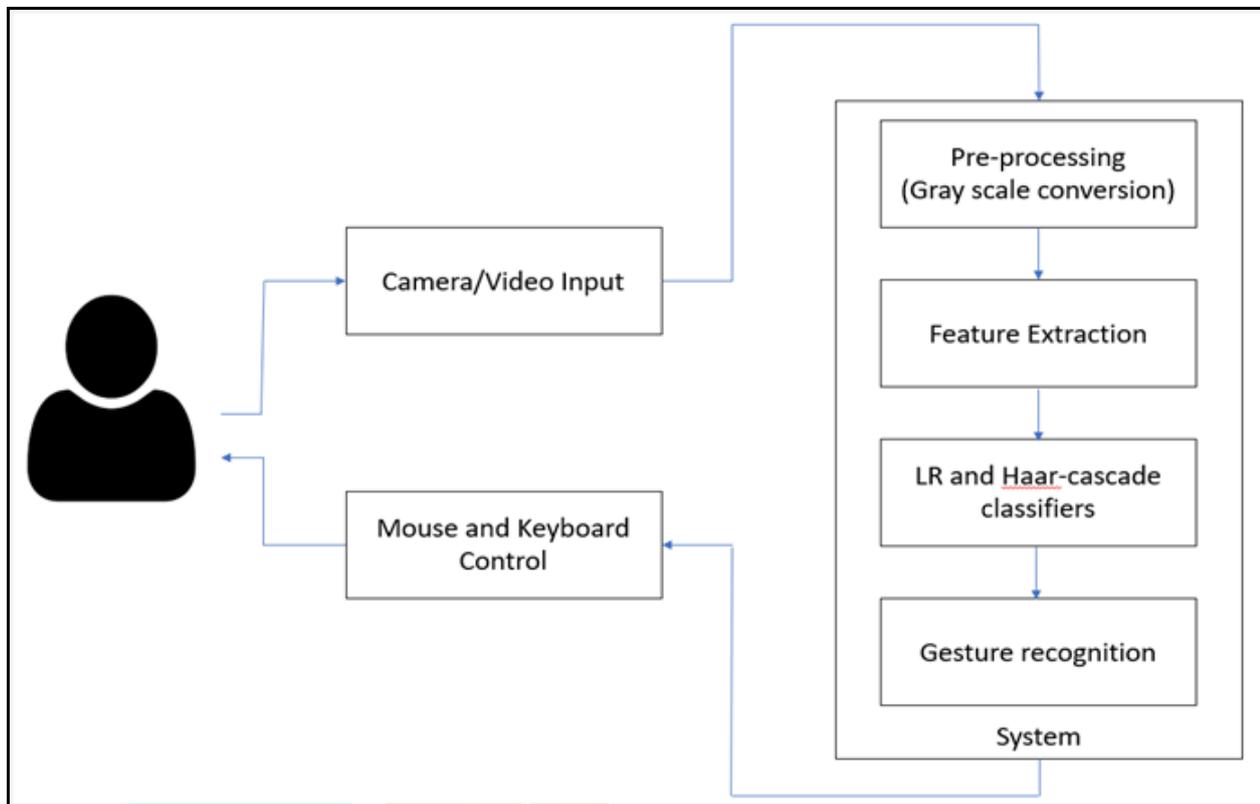


Fig. 2. System Architecture

IV. LIMITATION

- i. The proposed AI virtual mouse has various limitations, such as a slight loss of accuracy when using the right click mouse function, and the model has some difficulty selecting text by clicking and dragging.
- ii. This system will work efficiently where there is ample of light present.
- iii. Errors may occur if more than one face is detected.
- iv. When using the virtual keyboards, users may experience low text entry rates and the need to recalibrate frequently.

V. FUTURE SCOPE

- i. Currently, the system employs a static background, but in an augmented reality world, it would be very desired and essential to use this hand tracking system in a way that allows a user wearing a head-mounted display to interact with virtual 3D objects in the real world.
- ii. The system can be designed for medical imagery during surgery without touching patients or any surgical instruments.
- iii. This mouse system can be applicable as sign language for the dumb & deaf people. It can help them to interact with computing machines.

VI. CONCLUSION

This study proposes a framework that recognizes confront and hand motions and dispenses with the require for a mouse and console. This incorporates mouse cursor development, drag and tap, and console highlights such as printing letter sets and other console errands. Skin division is utilized to partition the color/image of the hand from the foundation. The strategy of expelling an arm proficiently overcomes the issue of capturing the whole body within the camera. In outline, the proposed calculation can distinguish and recognize hand motions and confront developments, permitting it to control mouse and console capacities as well as create a reasonable client interface. 3D printing, engineering plans, and indeed restorative methods may all be done from anywhere. This project is basic to implement and contains a wide extend of applications in restorative science, where computation is essential but cannot be completely realized due to lack of human-computer interface.

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