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AI Virtual Mouse

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ABSTRACT:-

Since the development of computer technology, the method of creating a process of interaction between a human and a computer has been evolving. In terms of HCI (Human-Computer Interaction) technology, the mouse is a fantastic invention. Although while wireless or Bluetooth mouse technology is constantly being developed, it is not entirely device-free. A Bluetooth mouse needs a connecting dongle and a battery to function. The difficulty of using a mouse is increased by the inclusion of additional gadgets. The suggested mouse mechanism surpasses this restriction. This article suggests an HCI-based virtual mouse system that makes use of hand movements and computer vision. a webcam or built-in camera that recorded a gesture that was then analysed using a colour segmentation and detection technique. With hands that have coloured caps on the tips, the user will be able to control some computer cursor operations. First, a user can scroll up or down and make left, right, double, and up or down clicks using various hand motions. This system uses a webcam or built-in camera to capture frames. It then processes the frames to make them trackable, identifies various user motions, and executes the mouse function. Hence, the suggested mouse solution removes the need for a device to use a mouse. Consequently, it can be seen that the development of HCI technology is advantageous.

Keywords- HCI (Human-computer interaction), HSV (hue saturation value), Hand Gesture, Color Detection, Gesture Recognition.

1. INTRODUCTION

As the techonolgies are developing day by day devices becoming compact in size. Some devices have gone wireless, some of them gone latent. This paper proposes a system that could make some the devices go latent in the future that is the future of HCI(Human-Computer Interaction). The proposal is to development of a virtual mouse using Gesture Recognition. The aim is to control mouse cursor functions using only a simple camera instead of a traditional or regular mouse device. The Virtual mouse works as a medium of the user and the machine only using a camera it help the user to interact with a machine without any mechanical or physical devices and control mouse functions. In this gesture recognition system, it is very possible to capture and track the fingurtip of hand with a webcam or built-in cam which is bearing a color cap or color sticky note paper and the sytsem track the color and movement of the hand and move cursor with it.

Typically we use a mouse, keyboard or other interacting devices which is mainly compact with the computer machine. The wireless devices also need a power source and connecting technologies, but in this paper, the user's bare hand is the only input option using a webcam. So, it's a very interactive way to control the mouse cursor.

This system is implemented in python programming language using the computer vision based library OpenCV. This system has the potential to replace the typical mouse and also the remote controller of machines. The only barrier is the lighting condition. That's why the system still can't be enough to replace the traditional mouse as most of the computers are used in poor lighting conditions.

A. Problem Description & Overview

To track fingurtips as a movable object, and to utilize it for mouse functions, the camera should be positioned in a way so that it can see the user's hands in the right positions. This can be used in space-saving situations, for those patients who don't have control over their limbs and for other similar cases. It's a virtual mouse instead of a physical mouse which will work only based on webcam captured frames and tracking fingertips.

B. Significance in Real World Application

Video conferencing is very popular nowdays. For this reason, most of the computer users use a webcam on their computer and most of the laptops have a built-in webcam. The proposed system which is webcam based, might be able to eliminate the need of a mouse partially. The process of interaction with a computer using hand gesture is a very interesting and effective approach to HCI(Human-Computer Interaction). There is some really good research on this interest. The hand gesture recongnition technology is also popular in sign language recognition.

C. Objective

The objective is to develop and implement an alternative system to control a mouse cursor. The ultimate outcome of this paper is to develop a system which recognizes hand gesture and controls mouse cursor using fingertips detection method of any computer.

2. ALGORITHM USED TO HAND TRACKING:

For the purpose of detection of hand gesture and hand tracking, the Mediapipe framework is used, and OpenCV library is used for computer vision. The algorithm makes use of the machine learning concept to track and recognize the hand gesture and hand tip.

1. MediaPipe:

MediaPipe is a framework which is used for applying in a machine learning pipeline, and it is an opensource framework of google. The MediaPipe framework is useful for cross platform development since the framework is built using the time series data. The MediaPipe framework is multimodal, where this framework can be applied to varous audios and videos.

2. OpenCV:

OpenCV is a computer vision library which contains image-processing algorithms for object detection. OpenCV is a library of python programming language, and real-time computer vision applications can be developed by using the computer vision library. The OpenCV library is used in image and video processing and also analysis such as face detection and object detection.

3. FUTURE SCOPE:

The proposed AI virtual mouse has some limitations such as small decrease in accuracy of the right click mouse function and also the model has some difficulties in executing clicking and dragging to select the text. These are some of the limitations of the proposed AI virtual mouse system, and these limitations will be overcome in our future work.

- **Advantages:**

1.Control the computer virtually.

2. Reduce the cost of mouse.

3. Enhance the attraction of using computer.

- **Disadvantages:**

1. Time consuming.

2. highly strain related work.

4. CONCLUSION:

The accuracy is very good and high for all the other gestures. Compared to previous approaches for virtual mouse, our model worked very well with 99% accuracy. The accuracy for right click is low because the gesture used for performing the particular mouse function is harder.

- **Data Availability:**

The hand tracking data used to support the finding of this study are included within the article. The study uses Google's framework; hence, no new data are needed to train the model.

Reference

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