Controlling mouse cursor using hand gesture

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Abstract

A real-time mouse cursor control system using static gestures was designed to achieve the goal of human-computer interaction (HCI) in this paper. The system uses the computer's own camera or external USB camera to collect video data, detect and recognize gestures of people in the video, and control the cursor movement or click in real time based on the gesture.

I. Introduction

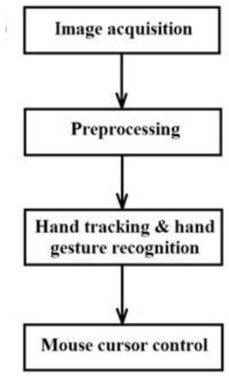
Hand gesture recognition technology is one of the hottest areas of research in the field of HCI. Supported by hand gesture recognition technology, computer devices and robots can be controlled more naturally and efficiently. By getting rid of the limitation of traditional HCI such as keyboard, mouse and remote control, the friendliness of HCI can be improved greatly. Gesture Controlled Virtual Mouse makes human-computer interaction simple by making use of Hand Gestures. The computer requires almost no direct contact. All I/O operations can be virtually controlled by using static and dynamic hand gestures. This project makes use of state-of-art Machine Learning and Computer Vision algorithms to recognize hand, which works smoothly without any additional hardware requirements.

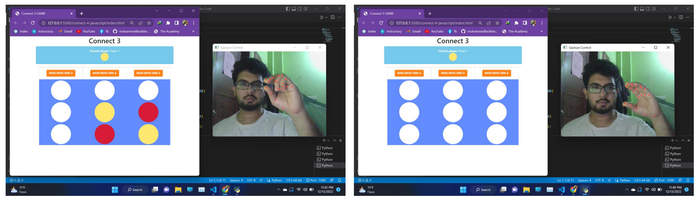
II. Background and Motivation

In the past years the interest regarding the development of human computer interaction systems increases. The relative low cost sensors, the existence of the software packages that offer functions for specific processing and allow an easy way to handle the communication between computers, computing devices and sensors stimulate the students, engineers and researchers to focus on building of natural intuitive user interfaces. Due to the fact that the human hand postures and gestures are still a powerful inter human communication research community keeps an active interest regarding the use of the hand gesture as a means to controller to communicate through it with artificial systems.

III. The System architecture

The aim of the implemented system is to control the windows mouse cursor using the human hand gestures. The system is composed by: (1) computer, (2) webcam Following the block diagram , the software application, which runs on the computer, takes an image (a captured frame/image) of the hand (where the user uses his hand as a mouse) through the webcam and process it regarding the tracking of the user hand and recognition of the hand gesture. The position of the hand on the image will be converted in the position of the mouse cursor on the computer display. The recognized hand gesture is converted in a mouse event as: left click right click or double click The considered gestures corresponding to the mouse events above mentioned . A hand gesture is considered as recognized if is detected the corresponding colored strip/strips. In Fig 1 is presented the default gesture used for mouse pointer control. The center of the red button is considered the position of the hand.





IV. Evaluation

Gesture Controlled Virtual Mouse makes human-computer interaction simple by making use of Hand Gestures and Voice Commands. The computer requires almost no direct contact. All i/o operations can be virtually controlled by using static and dynamic hand gestures along with a voice assistant. This project makes use of state-of-art Machine Learning and Computer Vision algorithms to recognize hand gestures and voice commands, which works smoothly without any additional hardware requirements. It leverages models such as CNN implemented by MediaPipe running on top of pybind11. It consists of two modules: One which works directly on hands by making use of MediaPipe Hand detection, and the other which makes use of Gloves of any uniform color. Currently, it works on the Windows platform.

V. Conclusion

The mainly improvements added by the present study are given by: the using of new proposed hand postures which are natural and more relaxed postures and the using of a blue hand pad which give a better hand detection of the hand and avoid the system to use additional software noise removal filters. These improvements correlated with the chosen hand feature used to identify the hand posture will give to the application an increase user-friendly behavior, a decreased computing time and a better recognition of the hand postures regarding the daylight level influence compared to the developed applications .

References

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