VIRTUAL MOUSE USING HAND GESTURE

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Abstract - Many technologies are evolving day by day. One such promising concept is Human-Machine Interface. For example wired mouse there is no extend limit. In wireless mouse Bluetooth hardware installed in the computer and Bluetooth dongle attached. But the proposed system as no such limitations and it is easily used in the current technology. The aim is to move the mouse cursor on the screen without using hardware such as a mouse and only by moving the cursor through finger movements i.e. the process of gesture recognition. In this paper, we present a novel approach for Human Computer Interaction (HCI) where cursor movement is controlled using a real-time camera.

Keywords - HCI, hand Gesture, web camera, background subtraction

I. INTRODUCTION TO THE SYSTEM

In this work, we tried to control mouse cursor movement and click events using a webcam. Processing techniques involve an image subtraction algorithm to detect hand. Once the hand is detected the system performs control actions. No additional hardware is required by the system other than standard webcam which is provided in every laptop computer.

II. SYSTEM ANALYSIS

Touchpad is the main problem in the current technology and it is not comfortable and convenient. For example in wired mouse there is a problem in extension limit. In wireless mouse software is needed such as Bluetooth Dongle software attached. So to avoid all these problems in these systems has no such disadvantages like hardware and software problems it only depends on hand gesture recognition. In the existing system, mouse task such as left, right clicking and scrolling it is on processing not fully implemented. Another major Disadvantage in existing System is controlling a mouse positioning and extract the hand shape from background.

III. IMAGE PROCESSING

It is a signal processing for the input such as images or frames of video; output can be in the form of image or a set of parameters or characteristics of an image. Most of the image processing uses two-dimensional technology. Image processing is possible not only digital but also optical and analog image processing, process is to split pixel into RGB components.

IMAGE ANALYSIS:

Image analysis involves the process of deriving the important information from images. It can be simply reading bar coded tags or identifying face from a person. In this system we do analysis of
various hand gesture(position) for that we detect hand movement from webcam. Digital image processing uses different computer algorithms to apply on digital images and perform particular related task. Digital signal processing is a subcategory of Digital image processing. It provides wide range of algorithms applied to input data and also removes noise easily during processing.

IV. PURPOSE

The purpose of the project is to create a virtual mouse that works with the help of a web camera. In this project a camera continuously takes images of hand movements of a user, which is then mapped into mouse inputs. This means that we can give inputs to computer without having any physical connection with the computer and without having any hardware movements.

V. PROBLEM DEFINITION

To develop a software solution to a problem, the first step is to understand the problem. The problem here is to develop a way so that humans can interact with a computer without having any physical connection with the computer. Many ideas were put forward but they all required physical movement of hardware. Another idea put forward was to use the principle of photoelectric effect. But for that a special hardware is needed and it is not economically feasible. So the final decision is to develop a virtual mouse which uses simple and cheap image processing techniques.

SYSTEM APPROACH:

- Capturing real time video using Web-Camera.
- Processing the individual image frame.
- Flipping of each image frame
- Conversion of each frame to a grey scale image
- Conversion of the detected image into a binary image
- Finding the region of the image and calculating its centroid.
- Tracking the mouse pointer using the coordinates obtained from the centroid.
- Simulating the left click and the right click events of the mouse by assigning different Hand gesture.

VI. METHODOLOGY

The implementation has been divided into various steps and each step has been explained below. The system flow explains the overview of the steps involved in the implementation of virtual mouse.
V. HARDWARE AND SOFTWARE REQUIREMENTS

Hardware requirements:
- Peripheral webcam at least 30 frames/second, 640x480 resolution

Software Requirements:
- .NET framework 3.5 or higher, (wrapper of OpenCV library for .NET framework),
- Webcam drivers (device specific), Microsoft Visual Studio

DESIGN

IMAGE RESIZE
Map Webcam camera coordinates into screen coordinates
SEGEMENTATION
Separate the hand from a background and also converted from RGB colour into YCbCr colour and then binary image (black and white).

DENOISE
Noise is to appear so we need to delete noisy pixels from the image. We use morphology algorithm performs erosion and dilation to eliminate noise. Erosion trims down the image area where the hand is not present. Dilation expands the area of the Image pixels which are not eroded.

FINDING CENTER AND THE SIZE OF THE HAND
First find the centre of the hand, and compute the radius from palm to get size of the hand. Draw a circle from the centre in which circle meets first black pixel. Then it returns a radius value.

FINDING FINGER TIP
To find biggest polygon convex hull algorithm is used it includes all vertices (finger tip) to check that the finger is folded or not.

CONTROLLING MOUSE
We use a Weighted speed control in order to set the priority of the gesture. First find the difference between current and previous image to detect the cursor move. If cursor movement is low, set to slow otherwise set priority and move fast.

VI. PROPOSED SYSTEM

➢ In this system we set a Priority for complex issues (i.e. we calculate a time for the particular event) so that existing problem is resolved.
➢ To resolve this we proposed a technique weighted speed cursor control for controlling the positioning of the mouse. For that we get the input of difference of the finger positioning of the current image and the previous image and evaluate the distance between the two images.
➢ Next, we move the mouse cursor if the gap between the two finger images far then the mouse cursor moves fast or, if the gap is so close then the cursor moves slow.
➢ We plan to add more features such as enlarging and shrinking windows, closing window, etc. by using the palm and multiple fingers.

VII. FUTURE ENHANCEMENT

Every innovation, it is important factor to reduce the humans effort in that Virtual reality place important role.

In future all technology is based on artificial intelligence and virtual reality.

• In future driverless cars will be implemented.
• Face detection is possible in low budget phones in future.
• 3D models (video games), and
• Medical imagery during surgery without touching patients or any things.

VIII. CONCLUSION

we are developing a system to control the mouse cursor using a Web camera. This system is based on computer vision algorithms and can do all mouse tasks. This system could be useful in presentations and to reduce work space. Features such as enlarging and shrinking windows, closing window, etc. by using the palm and multiple fingers.
REFERENCES


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