VIRTUAL HAND GESTURE CONTROL FOR PPT

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Abstract - This paper introduces a system for controlling the PowerPoint presentation using hand gestures captured by a webcam with gesture detection technology. The system enables users to move the cursor with their hand while wearing color caps or tapes and perform left-click and dragging actions with different hand gestures. Additionally, the system provides efficient presentation controlling skills, requiring only a low-resolution webcam as a sensor to track the user's hand-bearing color caps in two dimensions. The proposed system is developed using Python and OpenCV, taking advantage of hand gestures' natural and effortless communication. The camera's output is displayed on the monitor, and the shape and position data of the gesture are collected by detecting colors. The file transfer process is implemented using Python server programming.

Key Words: **Hand Gestures, Image capture, Processing, Masking, DnD Frame**

1. INTRODUCTION

The most efficient and expressive way of human communication is through hand gesture, which is a universally accepted language. It is pretty much expressive such that the dumb and deaf people could understand it. In this work, real-time hand gesture system is proposed. Experimental setup of the system uses fixed position low-cost web camera high definition recording feature mounted on the top of monitor of computer or a fixed camera on a laptop, which captures snapshot using Red Green Blue [RGB] color space from fixed distance. his work is divided into four stages such as image preprocessing, region extraction, feature extraction, feature matching. Recognition and the interpretation of sign language is one of the major issues for the communication with dump and deaf people.

In this project an effective hand gesture segmentation technique has been proposed based on the preprocessing, background subtraction and edge detection techniques [1]. Pre-processing is defined as procedure of formulating data for another process. The main objective of the preprocessing process is to transform the data into a form that can be more effectively and effortlessly processed. In the proposed work, the pre-processing techniques are created on the basis of different types of combinations from the subsequent hand gesture image processing operations such as capturing image, removing noise, background subtraction, and edge detection and these image processing methods are discussed is as follows.

Initially, the hand gesture images are captured from the vision-based camera, The hand gestures can be observed with different kind of interfaces like "data gloves" that accurately records every abduction angle and digit and position sensors for wrists and optical orientation or electromagnetic, requiring the user to wear trackers or gloves. Habitually, the glove-based interfaces even need theuser to be hitched to the computer, all minimizing time to user comfort and interface, conversely, vision-based interfaces offer unencumbered interaction with humans.

In this paper, we aim to create a cost-free hand recognition software for laptops and PCs with a webcam support. The project covers as a hand recognition tool that could be used to move the mouse pointer, perform simple operations like clicking and other hand gesture operations like moving file from computer to computer through delicate socket programming and performing simple but fascinating operations that could be covered with the hand recognition.

2. EXISTING SYSTEM

The existing system consists of the generic mouse and trackpad system of monitor controlling and the non-availability of a hand gesture system. The remote accessing of monitor screen using the hand gesture is unavailable. Even-though it is largely trying to implement the scope is simply restricted in the field of virtual mouse. The existing virtual mouse control system consists of the simple mouse operations using the hand recognition system, where we could perform the basic mouse operation like mouse pointer control, left click, right click, drag etc. The further use of the hand recognition is not been made use of. Even-though there are a number of systems which are used for hand recognition, the system they made used is the static hand recognition which is simply recognition of the shape made by hand and by defining an action for each shape made, which is limited to a number of defined actions and a large amount of confusion.

3. PROPOSED SYSTEM

Using the current system even-though there are a number of quick access methods available for the hand and mouse gesture for the laptops, using our project we could make use of the laptop or web-cam and by recognizing the handgesture we could control mouse and perform basic operations like mouse pointer controlling, select and deselect using left click, and a quick access feature for file transfer between the systems connected via network LAN cable. The project done is a "Zero Cost" hand recognition system for laptops, which uses simple algorithms to determine the hand, hand movements and by assigning an action for each movement[2]. But we have mainly concentrated on the mouse pointing and clicking actions along with an action for the file transfer between connectedsystems by hand action and the movements. The system weare implementing which is been written in python code be much more responsive and is easily implemented since python is a simple language and is platform independent with a flexibility and is portable which is desirable in creating a program which is focused in such an aim for creating a Virtual Mouse and Hand Recognition system. The system be much more extendable by defining actions for thehand movement for doing a specific action. It could befurther modified to any further extent by implementing suchactions for the set of hand gestures, the scope is restricted byyour imagination.

4. USE OF PROPOSED WORK

This Virtual Mouse Hand Recognition application uses a simple color cap on the finger without the additional requirement of the hardware for the controlling of the cursor using simple gestures and hand control. This is done using vision based hand gesture recognition with inputs from a webcam.

5. METHODOLOGY

In the Methodology, the method used in each component of the system will be explained separately. They are following subsections:

5.1 Camera Settings

The runtime operations are managed by the webcam of the connected laptop or desktop. To capture a video, we need to create a Video Capture object. Its argument can be either the device index or the name of a video file. Device index is just the number to specify which camera.Since we only use a single camera we pass it as '0'. We can add additional camera to the system and pass it as 1,2 and so on. After that, you can capture frame-by-frame. But at the end, don't forget to release the capture. We could also apply color detection techniques to any image by doing simple modifications in the code.

5.2 Capturing frames

The infinite loop is used so that the web camera captures the frames in every instance and is open during the entire course of the program. We capture the live feed stream, frame by frame. Then we process each captured frame which is in RGB(default) color space to HSV color space. There are more than 150 color-space conversion methods available in OpenCV. But we will look into only two which are most widely used ones, BGR to Gray and BGR to HSV.
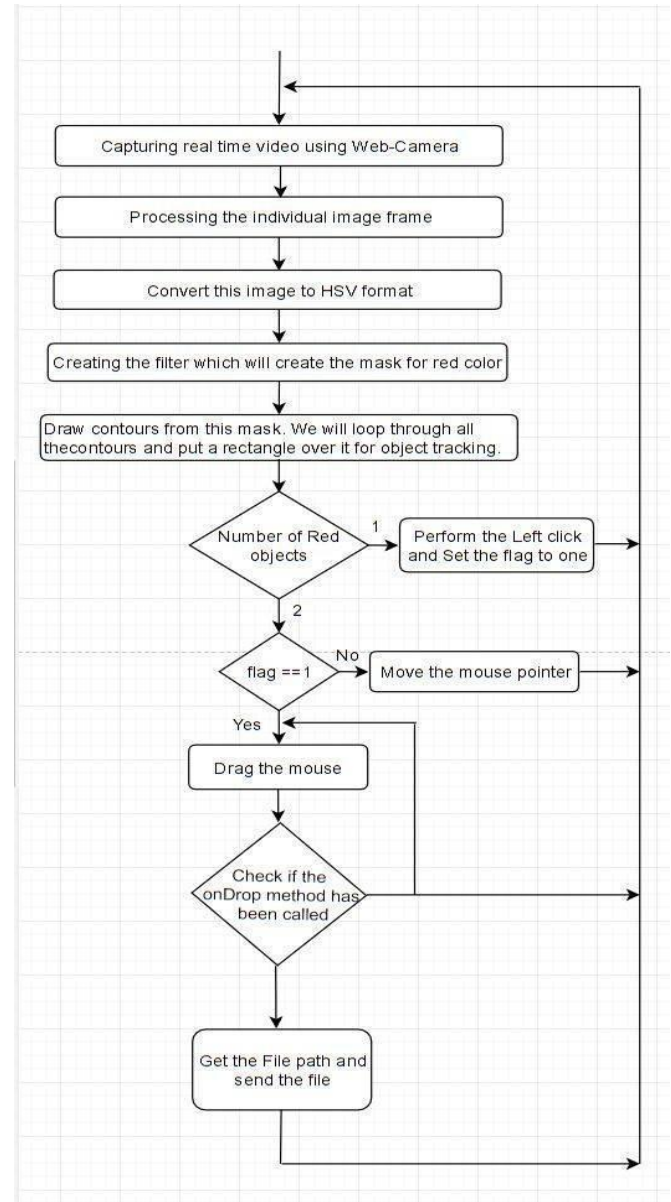

Fig -1: Flowchart

5.3 Masking technique

The mask is basically creating some specific region of the image following certain rules. Here we are creating a mask that comprises of an object in red color. After that we perform a bitwise AND operation on the Input image and the

Threshold image, which result in only the red colored objects are highlighted. This result of the AND operation is stored in res. We then display the frame, res and mask on 3 separate windows using imshow() function.

5.4 Display the frame

The imShow() is a function of HighGui and it is required to call the waitKey regulerly. The processing of the event loop of the imshow() function is done by calling waitKey. The function waitKey() waits for key event for a "delay" (here, 5 milliseconds). Windows events like redraw, resizing, input event etc. are processed by HighGui. So we call the waitKey function, even with a 1ms delay.

5.5 Hand Movement

We have to first calculate the center of both detected red object which we can easily do by taking the average of the bounding boxes maximum and minimum points. now we got 2 co-ordinate from the center of the 2 objects we will find the average of that and we will get the red point shown in the image. We are converting the detected coordinate from camera resolution to the actual screen resolution. After that we set the location as the mouse_position. but to move the mouse pointer it will take time. So we have to wait till the mouse pointer reaches that point. So we started a loop and we are not doing anything there we are just waiting will the current mouse location is same as assigned mouse location. That is for the open gesture.

5.6 Single Finger

The next step is to implement the Single Finger Guesture where It's used to highlight the main points of the presentation with a red color highlight.

5.7 Two Fingers

In order to stop the highlight where two fingers can be used to stop the highlight and just can see all he text using it.

5.8 Three Fingers

The Three fingers are used to undo the highlighted text where it can be used to erase and remove all the highlighted text.

5.9 Thumb Finger
The thumb finger is used to go to the previous slide.
5.10   Little finger
This Finger is used to forward the presentation slides.

File Transfer

6. RESULT AND EVALUATION

In this paper, we tried to focus on help patients who don't have control of their limbs and also improvise the interaction between the machine and humans.Our motive was to create this technology in the cheapest possible way and also to create it under a standardized operating system.

The proposed system controls the functions of the mouse pointer by detecting red, and perform mouse functions such as highlight,Erase, Forwardr and BackwardThismethod detect the red colour objects for the mouse control.The user uses the red colour obects on their fingertip for the better performance. When the number of contours are two, then it performs the simple Finger movement action. Otherwise, when the number of contour is one then it perform the Highlight

This system is mainly aimed to reduce the use of hard components attatched with the computer. Although the application can be run in a ordinary computer having a web camera. but ideally it requires having at least 2MP frontal camera with at least Pentium processor and at least 256 MB RAM. We can see these all operations on the following images:
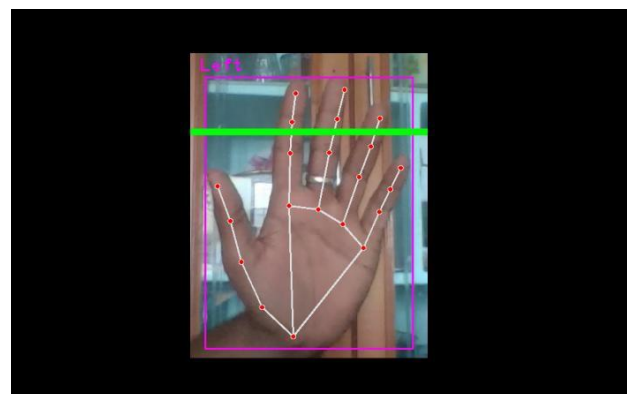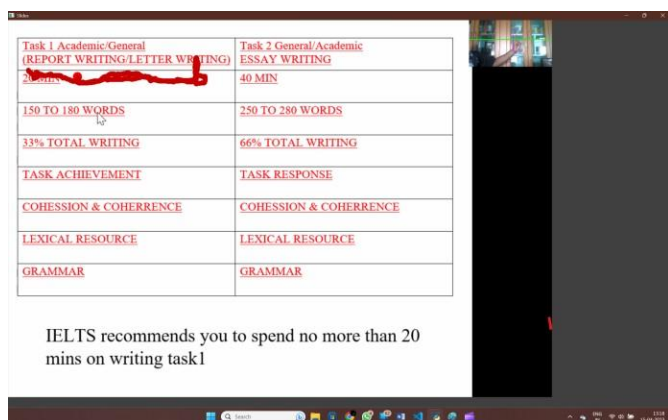

Fig 2 : Hand Dectection
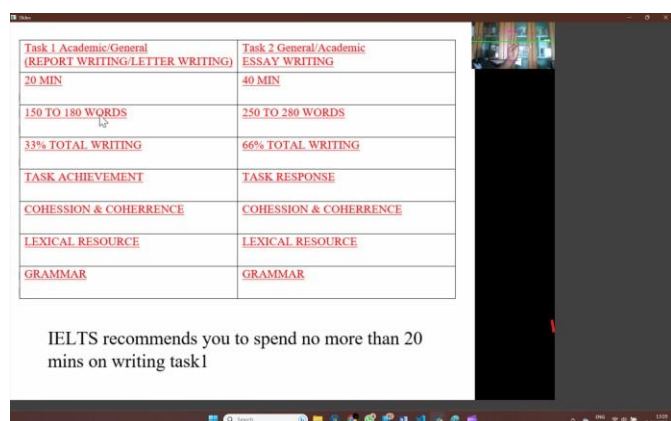
Fig 3 : Performing Highlight

Fig 4 : Performing Erasing

7. CONCLUSIONS

Gesture recognition gives the best interaction between human and machine. Gesture recognition is also important for developing alternative human computer interaction modalities. It enables human to interface with machine in a more natural way. Gesture recognition can be used for many applications like sign language recognition for deaf and dumb people, robot control etc.

This technology has wide applications in the fields of augmented reality, computer graphics, computer gaming, prosthetics, and biomedical instrumentation. Digital Canvas is an extension of our system which is gaining popularity among artists, by which the artist could create 2D or 3D images using the Virtual Mouse technology using the hand as brush and a Virtual Reality kit or a monitor as display set. This technology can be used to help patients who don't have control of their limbs. In case of computer graphics and gaming this technology has been applied in modern gaming consoles to create interactive games where a person's motions are tracked and interpreted as commands.

The major extension to this work can be done to make system able to work at much complex background and compatible with different light conditions. It can be made as an effective user interface and which can include all mouse functionalities. And also, it would be ideal to research into advanced mathematical materials for image processing and investigate on different hardware solutions that would result in more accurate hand detections. Not only did this project show the different gesture operations that could be done by the users but it also demonstrated the potential in simplifying user interactions with personal computers and hardware systems.

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