Virtual Mouse Control Using Hand Class Gesture

Article · December 2020

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Virtual Mouse Control Using Hand Class Gesture

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Abstract **- This paper proposes a way to control the position of the cursor with the bare hands without using any electronic device. While the operations like clicking and dragging of objects will be performed with different hand gestures. The proposed system will only require a webcam as an input device. The software's that will be required to implement the proposed system are OpenCV and python. The output of the camera will be displayed on the system's screen so that it can be further calibrated by the user. The python dependencies that will be used for implementing this system are NumPy, math, wx and mouse.**

Index Terms - OpenCv; Numpy; Calibrated; Gesture.

I. INTRODUCTION

It has been generations since we have been using hand gestures for communicating in human society[1].The shaking of hands, Thumbs up and Thumbs down signs have been ever existing in the environment. It is believed that gestures are the easiest way of interaction with anyone. So then why not apply it to the machines that we are using. In this work, we are demonstrating, real- gesture. The initial setup includes a low-cost USB web camera that can be used for providing the input to the system. The complete process is divided into 4 steps which are frame-capturing, image-processing, region-extraction, feature-matching. To the extreme, it can also be called as hardware because it uses a camera for tracking hands [5].

Aim and objective of research work include-

- For most laptop touchpad is not the most comfortable and convenient.
- Main objective pre-processing is to represent the data in such a way that it can be easily interpreted and processed by the system.
- Reduce cost of hardware [2].

It focuses on extracting the features over the human hands and then matching their features to recognize the movement of the hand.

Project essential feature-

- User friendly.
- Portable.
- Handle simple operation left- click dragging, minimizing.
- No hardware [3].

II. EXISTING SYSTEM

The existing system consists of a mouse that can be either wireless or wired to control the cursor, know we can use hand gestures to monitoring the system. The existing virtual mouse control system consists of the simple mouse operation using the colored tips for detection which are captured by web-cam, hence colored fingers acts as an object which the web-cam sense color like red, green, blue color to monitor the system, whereas could perform basic mouse operation like minimize, drag, scroll up , scroll down , left-click right-click using hand gestures without any colored finger because skin color recognition system is more flexible than the existing system.

In the existing system use static hand recognition like fingertip identification, hand shape, Number of fingers to defined action explicitly , which makes a system more complex to understand and difficult to use.

III. PROPOSED SYSTEM

The system works by identifying the color of the hand and decides the position of the cursor accordingly but there are different conditions and scenario which make it difficult for the algorithm to run in the real environment due to the following reason as shown in Fig. 1.

- Noises in the environment.
- Lighting condition in the environment
- Different textures of skin.
- Background object in the same colour of skin.

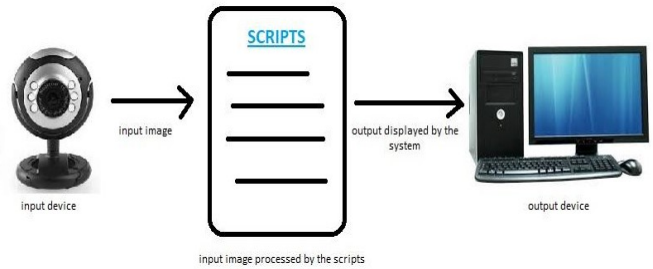

Fig. 1 Input Processing

So it becomes very important that the colour determining algorithm works accurately. The proposed system can work for the skin tone of any color as well as can work accurately in any lighting condition as well for the purpose of clicking the user needs to create a 15 degree angle between its two-finger the proposed system can easily replace the traditional mouse

as well as the algorithm that requires colored tapes for controlling the mouse .the research paper can be a pioneer in its field and can be a source of further research in the corresponding field. The project can be developed with "zero-cost" and can easily integrate with the existing system.

IV. APPLICATION OF PROPOSED WORK

This work can easily replace the traditional mouse system that has been in existence for decades with the use of this algorithm the user can control the mouse without the fuss of any other hardware device this is done using a hand gestures recognition with inputs from a web-cam.

V. METHODOLOGY

The following steps are included to develop the algorithm:-

(i) The first step is to capture the image using the camera.
(ii) The camera then extracts and recognizes the human hand from the input image.
(iii) Then the position of the human hand is stored in the system using the regular" coordinate-system".
(iv) Then when the second frame is captured. The position of the hand from the second frame is captured and is stored in the system.
(v) Then the position of both hands is compared and then the cursor moves accordingly.
(vi)Now for the system of clicking the angle between the two hands of the finger is measured and if the angle is less than 15 degrees the system responds to it as a left-click. In this way, the complete working of the mouse can be done with bare hands.

By this paper, we aim to create totally cost-free hand recognition software for laptops and PCs with the help of web-cam support .The project emphasis on creating software that can be used to move the cursor with the help of hands and performing operations like clicking.

A. Activating Camera

The first step is to activate the camera so that the input can be provided to the system for this to happen we need to assign the resources of the camera to a variable the command that will be used for this purpose is cam=cv2. Video Capture(0) this command will activate the camera that is connected to the system and will be able to take the input from the camera as shown in Fig. 2.

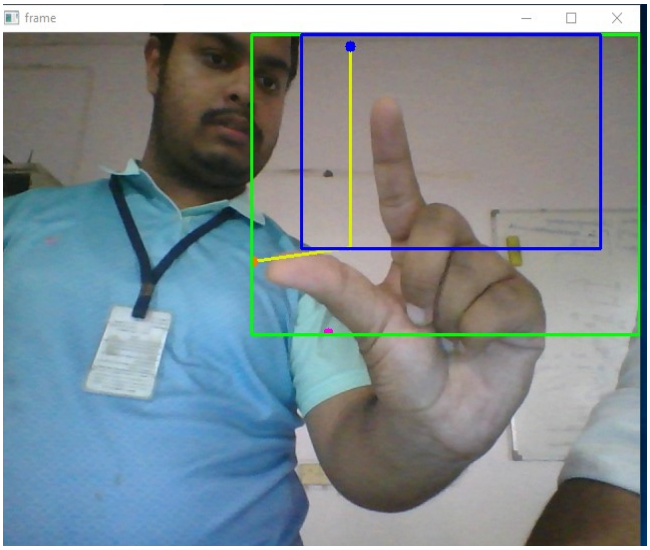

Fig 2 Activating the USB web-cam

B. Skin Color Extraction

To identify the skin color and separating it from the other colors of the background for this we use the mask and the kernel function the mask function identifies the skin color using the RGB parameters which range from [92, 56, 54] to [255,223,196] than the open kernels and the close kernels are used to remove the noises from the input.

The open kernel and close kernel work on a simple theory that if the pixilated noise bit is greater than the stored value than it will be removed using the masking effect, hence only the correct input is provided to the system for the process of computer as shown in Fig. 3.

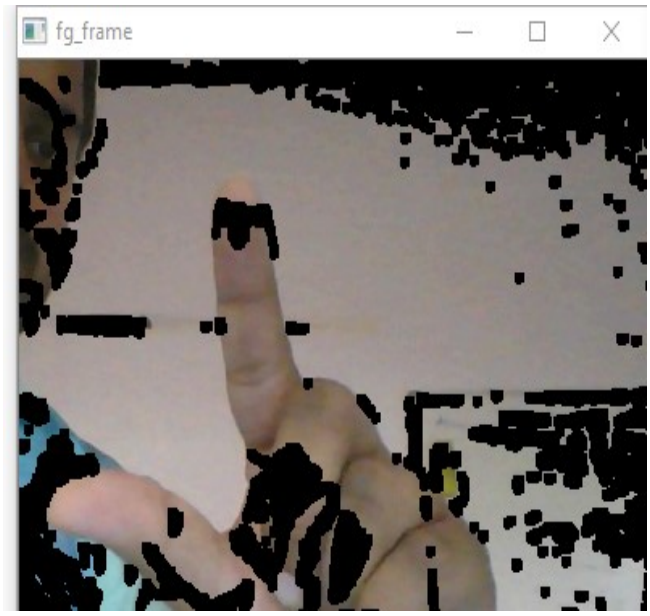

Fig 3.Extracting the skin color from input image

C. Cursor Movement

For moving the cursor the first step is to find the middle of the hand which can be determined using the following command.

Algorithm

1.var_leftmost→min_argument[tuple(hull[hull[:,:,0].argmin()][0])]

2.var_rightmost→max_argument[tuple(my_con[my_con[:,:,0].argmax()][0])

3.var_topmost→tuple assignment (hull [hull [:, :,1].argmin()][0])

4.var_bottommost→tupleassignment(my_con[my_con[:,:,1].argmax()][0])

5.var_Temp→bottommost[0]+30

6.cv2.line(roi,topmost,(topmost[0],h-280),(0,242,225),2)

7.cv2.line(roi,leftmost,(topmost[0],bottommost[1]-80),(0,242,225),2);

The following part of the code is responsible for finding the middle point of the hand the coordinates of the midpoint of the hand will be used for moving the cursor in different directions depending on the movement of the corresponding users.

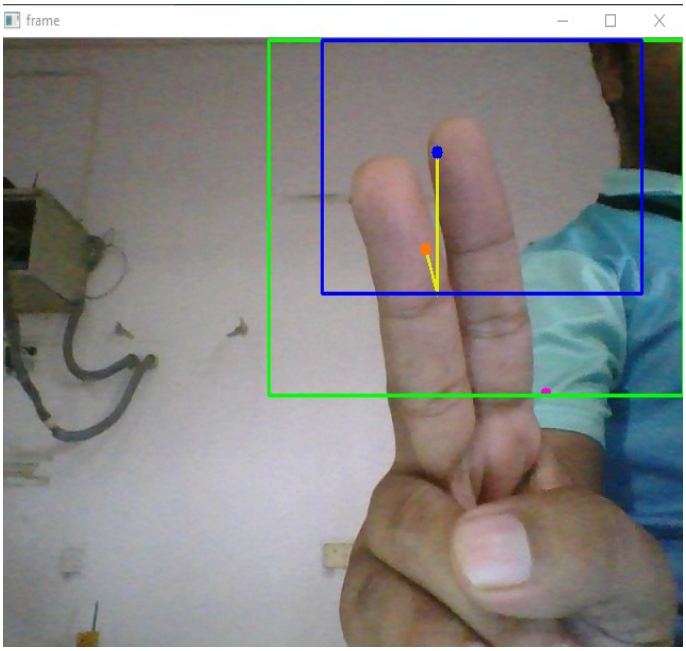

Fig 4.Performing clicking operation by creating angle of less than 15 degree

D. Displaying Output

A window will pop up on the screen of the user displaying the hands of the user and the subordinates lines controlling the cursor the output can be shown by the command cv2.imshow('frame', frame); other than only showing the camera input window the user also provided with additional information such as additional and appropriate sources of light in the background which will help the user in setting the surroundings right as shown in Fig. 5.

Fig 5 Displaying the Output

E. Flow chart

[1]Represent the capturing the frame from the web- cam and Process the frame capturing by the web-cam after processing convert the image HSV to RGB format.

[2] Creating the filter which create mask of skin color.

[3] If the input provided by the user through the web-cam is skin color than calculating the midpoint of the image otherwise processing the frame provided by the webcam.

[4] If the angle between the two points is less than 15 degree perform operation left click else move cursor in the direction of input image.

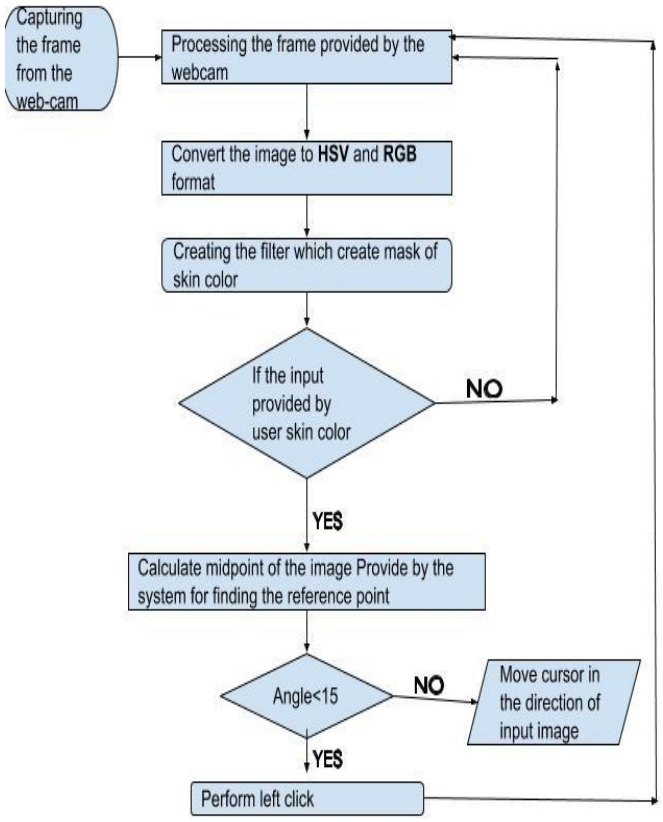

Fig 6 Flow Chart of Proposed Methodology

VI. RESULTS AND EVALUATION

The motive of this paper was to make the machine more interactive and responsive towards human behavior. The sole aim of this paper was to make a technology that is affordable and portable with any standard operating system.

The proposed system is used to control the pointer of the mouse by detecting the human hand and moving the pointer in the direction in the human hand respectively. the system Control simple function of the mouse such as left-clicking, dragging and cursor movement.

The method detects the hand of the human skin and tracks it continuously for the movement of the cursor when the angle between the fingers of the human hand is less than 15 degree the process performs the task of the left-click.

TABLE I: Comparison of Existing and Proposed System

Feature	Existing System	Proposed System
Stability	The Existing System is poor on stability front	The proposed system is very stable as compared to its predecessor
environment	The existing system is highly dependent on the environment in which the system is being used	The proposed system has a very les dependency on the environmental factors.
Complexity	The existing system are very complex and require powerful processors	The proposed system is very simple and requires very basic processors
Practicality	The existing system in not a practically viable option in the real world	The proposed system is a practically viable option in the real world.
Future Perspective	The existing system does not integrate well with the existing technology	The existing system can integrate well with the other technologies

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