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A SURVEY ON MOUSE CONTROL AND CHARACTER RECOGNITION USING HAND GESTURES

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ABSTRACT:

As the growth of computer technology is immense, this paper proposes the mouse control system by using hand gestures captured from webcam through a color detection technique. This system will allow the user to perform the operations such as select, click, scroll, drag performed using different hand gestures. The proposed system uses the low-resolution webcam that acts as a sensor and it is able to track the user hand. The system will be implemented by using Python and OpenCV. Hand gesture is one of the most effortless and natural way of communication.

INTRODUCTION:

One of the efficient ways of human communication is through hand gesture which is universally accepted. It could be easily understood by any people. The experimental setup of the system uses Low-cost web camera with high definition recording feature mounted on the top of the monitor of the computer or fixed camera on laptop, which captures the snapshot using Red, Green, Blue(RGB) color space from fixed distance. It can be divided into four stages such as

Image preprocessing, Region extraction, Noise reduction, Edge detection.

In this project an effective hand gesture techniques has detection. After this stages the following operations would be performed.

In this project an effective hand been proposed based on the preprocessing, Background subtraction and Edge detection technique. The main objective of preprocessing is to transform the data that can be more effectively and effortlessly processed. In the proposed work preprocessing can be performed by the combination of Capturing image, Removing noise, Background subtraction and Edge detection. Initially, the hand gesture images are captured from the vision-based camera by using wear trackers or gloves. By this project we are aiming to provide the cost-free hand recognition software for laptops and pc with webcam support. The project covers the hand recognition tool which could be used to used to move the mouse pointer and performs the operations like click, select, scroll, character recognition events.

PROPOSED SYSTEM:

Even though there are a number of quick access methods are available for hand and mouse gesture, using our project we could make use of laptop or webcam and by recognizing the hand gesture we could control mouse and perform the basic operation like mouse pointer controlling, select, deselect, left click, right click, character recognition. It uses the simple algorithm (CONVEX HULL algorithm) to determine the hands, hand movements and by assigning an action for each movement. The system we are implementing is written in python code which is more responsive and easily implemented since python is a simple language and is platform independent with a great flexibility and also portable which is focused to create a virtual mouse and hand recognition system. The scope is restricted by your imagination.

USE OF PROPOSED WORK:

This virtual mouse hand recognition application uses a finger without the additional requirements of the hardware. This is done by using vision based hand gesture recognition with input from a webcam.

METHODS:

In this method each component of the system will be explained separately. They are the following subsections:

CAMERA SETTING:

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. Image can be captured frame-by-frame. But at the end don't forgot to release the capture. We could also apply color detection technique to any image by doing simple modifications in the code.

CAPTURING FRAME:

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.

MASKING TECHNIQUES:

During masking the bitwise AND operations on the input image and the threshold image is performed, which results in only the red color objects are highlighted. The result of AND operations are stored in the res. When displaying frame, res and mask on three separate windows using imshow() function.

DISPLAY THE FRAME:

The imshow() function is required to call the wait key regularly. The loop of imshow() function is done by calling wait key. So, we call the wait key function with a 1ms delay.

MOUSE 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-ordinates 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.

CLICKING:

The next step is to implement the close gesture. The operation is performed by clicking the object and dragging it. It is similar to the open gesture, but the difference is we only have one object here so we only need to calculate the center of it. And that will be placed on the location where we will position our mouse pointer. Instead of mouse release operation we will be performing a mouse press operation

DRAG:

In order to implement the dragging we introduce a variable 'pinch flag'. It will be set to 1 if it was clicked earlier. So after clicking whenever we find the open gesture we check if the pinch flag is set to 1. If it is set to one then Drag operation is performed otherwise the mouse move operation is performed.

CHARACTER RECOGNITION:

Step 1:

LOAD_DATA:

We use Python's *mnist* library to load the data. Let's now get the data ready to be fed to the model. Splitting the data into train and test sets, standardizing the images and other preliminary stuff.

DEFINE MODEL:

Keras, models are defined as sequence of layers. We first initialize a '**Sequential Model**' and then we add the layers with respective neurons in them.

COMPILE MODEL:

Now that the model is defined, we can compile it. Compiling the model uses the efficient numerical libraries under the covers (the so-called backend) such as Theano or TensorFlow. Here, we specify some properties needed to train the network.

FIT_MODEL:

Here, we train the model using a model check pointer, which will help us save the best model.

EVALUATE_MODEL:

Test accuracy of the model on the EMNIST dataset was **91.1%**.

Step 2:

Train A Convolutional Neural Network Model

Step 3:

Initializing Stuff:

First, we load the models built in the previous steps. We then create a letters dictionary, *blueLower* and *blueUpper* boundaries to

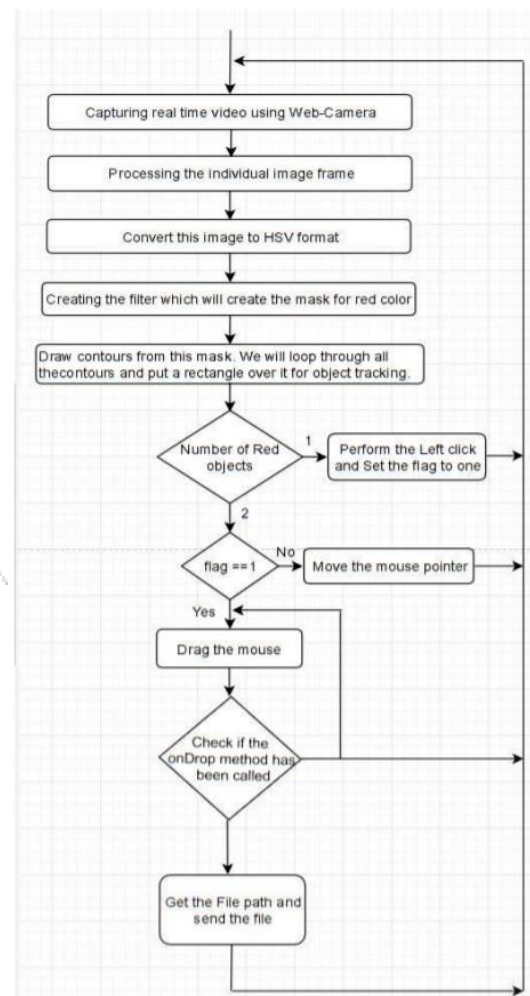
detect the blue bottle cap, a *kernel* to smooth things along the way, an empty *blackboard* to store the writings in white (just like the alphabet in the EMNIST dataset), a deque to store all the *points* generated by the pen (blue bottle cap), and a couple of default value variables.

Step 4:

CAPTURING THE WRITINGS:

Once we start reading the input video frame by frame, we try to find the blue bottle cap and use it as a pen. We use the OpenCV's *cv2.VideoCapture()* method to read the video, frame by frame.

Step 5: Scraping The Writing And Passing It To The Mode



FLOWCHART

RESULT AND EVALUATION:

In this paper, we tried to focus on to improve the interaction between 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 .This system is mainly aimed to reduce the use of hardware components attached with the computer. Although the application can be run in ordinary computer having atleast 2MB front camera with atleast Pentium processor and atleast 256MB RAM.

CONCLUSION:

Hand gesture recognition provides the best interaction between the human and machine. Gesture recognition is also important for developing alternative human computer interaction. It enables human to interface with machine in a more natural way. This technology has wide applications in the fields of augmented reality, computer graphics, computer gaming, prosthetics, and biomedical instrumentation

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