REAL-TIME HAND GESTURE RECOGNITION

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ABSTRACT: Hand gesture recognition is one of the systems that can detect the gesture of hand in a real time video. The gesture of hand is classified within a certain area of interest. In this study, designing of the hand gesture recognition is one of the complicated jobs that involves two major problems. Firstly, is the detection of hand. Another problem is to create the sign that is suitable to be used for one hand in a time. This project concentrates on how a system could detect, recognize and interpret the hand gesture recognition through computer vision with the challenging factors which variability in pose, orientation, location and scale. To perform well for developing this project, different types of gestures such as numbers and sign languages need to be created in this system. The image taken from the real time video is analyzed via Classifier to detect the gesture of hand before the image processing is done or in the other word to detect the appearance of hand in a frame. The explanation of the results will be focused on the simulation part since the different for the hardware implementation is the source code to read the real-time input video. The developing of hand gesture recognition using Python and OpenCV can be implemented by applying the theories of hand segmentation and the hand detection.

INTRODUCTION

This project is a novel approach to help the user to control the music player using Hand Gestures of the user. The webcam captures the user's hand gestures. These hand gestures are then extracted and processed. According to the gesture of the user, the music player will be automated to its working. of this, coding standards are followed for easy maintainability andextensibility.

By keeping mind that today we are using the music controllers using the Keyboards, Mouse etc... For making the operation of the music controller easy, we are now presenting this music controller, that shows the system for the hand gesture that made as the basis of the detection of the features that are based on the data that we have processed before they are like shape based features like the orientation, thumb in terms of raised, thumb in terms of folded

fingers of the hand, status of the fingers that are placed and the location of the image. By this, one can do the simple gesture of the movement of hand in front of the webcam, or can simply wave that which can turn the switch or pause the music player, move to next song, move to previous song that was being played by the person. Hence we introduced the Hand gesture music controller using Tensor-flow.

Gesture recognition is a computer science and the language of technology that made as the goal for interpreting human gestures by mathematical algorithms. It is just like the Chief John Anderton(played by Tom Cruise) that he controls the computer by the deftly moving his hands around in a 3D space that has provided by the system.

In the present days as Technology has been developed, people more often depending on the computers only. To perform any task, Keyboard and mouse are the input devices used widely that are used for the interaction of user with computer. For that purpose the people who are in need spends time more in front of the computers only, because of this situation people are affected by the health problems. As an alternate method we can use the body language and the signatures that make the work of a person easy because of the vision, synaptic interactions that are initiated during the functioning of the brain that leads to the development.

For this scenario here we have utilized the web camera that is present on the system to capture the image. By taking the input that has been used can be static hand gesture that uses only single image that can be processed at the end of the input classifier. The process of the pre-processing can be applied here for the removal of the Background noise. The segmented hand can be processed for the extraction of the features of the hand gestures. Here we trained a convolutional neural network(CNN) that can be used to match the features of the hand gesture of the people. The output that is present in the trained model can be used to perform the corresponding action on the music controller.

EXISTING SYSTEM

Since years, we Gesture Recognition and posture Recognition became a burning term. We have many hand gesture recognition and tracking of various types of the hand postures and gesture systems. If we use any technique it contains advantages and disadvantages also. Same as like that every technique have advantages and disadvantages also. The old technique that we have used before is the wired method. Here the technique can be used for the purpose of the users to tied up themselves to provide the interface or the connection with the computing device.

In the wired technology, users are connected through the wires only. Due to that the users cannot Rome freely in the room or the area that where the user sitting because of that wires

connected are only limited length.

The updated technology is used for the better usage and result of the system. Hence this can be motivated our team for the gesture controller.

PROPOSE SYSTEM

By considering all these aspects and the requirement of the highly robust and the efficient gesture identification and recognition system for the real time HCI development of the different gesture or posture based applications. By introducing this project work that shows a real time and the effective operating of the gestures that can be used for the purpose of the performing the corresponding music controller operations. The algorithm that here we used can be divided to the three main steps that used to perform the five operations of the music controller. The main steps used here are the: segmentation, calculating the features and the classification of the images.

The algorithm that we have used in this project takes the input from the user in the form of the postures and gestures. From the input that is given by the user the output can be defined and derived. By that input the result will be displayed and functioning of the music player. The convolutional neural network model can be used for matching the features of the input that we has been given and then it matches the input and then generates the output from the given inputs. In the

generated output the output is employed to perform the particular music operations that are given by the system.

Hence for this purpose we are going to implement the gesture music player.
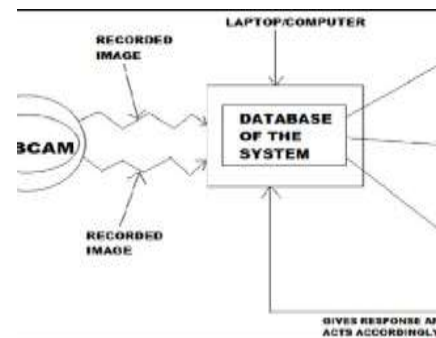

Figure:1:Existing image

From this existing system only we have proposed this system. Hence can be implemented.

Figure:2:original image

This is the system that can here we using. The image shown above is an example for the implementation.

IMPLEMENTATION (modules)

The implementation can be done by using some of the features that can be defined by the system that the user needs to be derive the output.

● **DATASET:**

The data set that we are giving or applying to the system contains various images of the hand gestures that can be of various types. The images that are given as input can be re-sized into a particular dimensions. And after that they are processed, by processing they will fit for the training the neural network.

The hand gestures given can be divided and processed into the following modules that can be defined.

1. Preprocessing.

2. Feature extraction of the image processed.

3. Real time classification.

METHODOLOGY

1. Preprocessing:

Preprocessing is the process of the processing the image in the sequence for the recognition, the pre-processing is the step that is performed to get the appropriate image, that which will be required for the classification of the images in the real time. So here in this step it contains some steps that are to be defined. The main effect of this processing the data is to extract the hand only from the user given input because if once the hand is detected from the input that has been given by the user that

can be processed and recognized easily. So preprocessing uses and contains the steps and consists the following tasks. They are:

Video: The video is the sequence of the moving images that moves fast. The fast images moving can be measured by the measure called as the Frames per second. If the video contains the FPS of 30, that means 30 images will be displayed every second. As same as, one new frame will be displayed after every 25 milliseconds.

Video Capture: The video that is displayed can be captured by using the camera. To read the video file, one need to pass the arguments for the capturing of the video. The argument can be named as the video file or else device index.

OpenCV: OpenCV is a tool which is used widely in computer tool. It is the computer vision library for real-time applications, written in the languages like C and C++. And this works with the operating systems like Windows, Linux and Mac platforms.

Example: cam=cv2.VideoCapture(0)

r,image=cam=read()

Example image can be Figure1.

ROI: ROI stands for the Region of Interest that is the region which is proposed for the original image. We can place the image in the region of interest for the further processing.

x0,y0,width=335,105,300

ROI=image[y0:y0+width,x0:x0+width]

GrayScaling:

Gray Scaling is a technique used to convert a BGR image to Grey image without any color. Here, we use two different functions. They are:

> cvtColor()

> GaussianBlur()

Thresholding:

Here, we apply threshold limits to the grey image and form a complete black and white image. To do this again we two different functions. They are:

adaptive Threshold()

> threshold()

Algorithm Used:

Convolutional Neural Network(CNN):

An artificial neural network used in image recognition and processing that is specifically designed to process pixel data. Here, we have used different functions inCNN algorithm to convert a 3-Dimensional image to 2-Dimensional image. They are:

- > ReLU(Rectified Linear Unit) (relu)
- softmax
- Conv2D()
- > MaxPooling2D()
- > Flatten(), Dense()

SAMPLESCREENS

Figure3:Image of ROI.

Figure4:Grayscale image.

Figure5:Difference Image

Figure6:Threshold image

Figure7:Test case example1

Figure8:Test case example2

CONCLUSION

Currently, we are used to operate the music player using input systems like keyboard, mouse etc.,.

After implementation of this project we will be able to operate the music player just by using our hand gestures.

FUTURE SCOPE:

Enhance the recognition capability for various lighting conditions.

- ✓ Achieving more accuracy.

- ✓ Implementing more number of gestures.

- ✓ Identifying multiple number of gestures.

- ✓ Applying gesture recognition for accessing internet applications.

- ✓ Provide editing mechanism by using gestures.

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