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Review on: Hand Gesture Based Interactive Photo Slider

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Abstract: In this paper, project presentation or even in class rooms can be effective whenslideshow presentation is used. There are various means to control slides which require devices like mouse, keyboard, or laser pointer etc. The disadvantage is one must have prior knowledge about the devices in order to operate them. This paper proposes the methods to control the slides during a presentation using bare hands and compares their efficiencies. The proposed methods employ hand gestures given by the user as input. The gestures are identified by counting the number of active fingers and then slides are controlled.

Keywords: hand gestures, skin segmentation, active fingers, finger count.

1. INTRODUCTION

Vision based gesture recognition techniques are of major interest in the field of research. People can interact with the system in a device-free manner and this property of vision based hand gestures make them user friendly. The hand gestures must be identified in any environment .i.e. under varying illumination conditions. The image or video acquired as input may be noisy or may reduce the performance by recognizing surrounding as hand region. The acquired data is subjected to segmentation and processed further to make it fit for approximation with the gestures (data) stored in the database. The other means of detecting hand gestures involves usage of markers or gloves to identify the hand gestures [1], [2], [3]. Some acquire the hand gestures using two cameras to obtain the 3D view of the hand and from the 3D model of the hand and then gestures are recognized [4]. But it involves storage of images of hand to compare with the acquired data and makes use of complex algorithm to compare the images and identify the correct gestures. [5], [6] and [7] involves training phase to capture the gestures and then are used to compare with the acquired input.

Controlling the slideshow is a vital task during presentation. The slides must be controlled according to the presenter's requirement. There are various ways to control the slides but most of them depend on external devices such as mouse, keyboard, laser pointer, etc. [8]. As described above the user may carry the device or may wear some bands or markers or gloves to control the slides with hand gesture. Some of these gloves are connected to the computer to detect the movement of hand which makes gesture recognition a complex task [1]. [9], [10] uses distance transform techniques but they use database to recognize hand position which is time consuming and complex.

This paper suggests two techniques to control the slides of PowerPoint presentation in a device free manner without any markers or gloves. Using bare hand the gesture is given as input to the webcam connected to the computer. Then using an algorithm which computes the number of active fingers, the gesture is recognized and the slideshow is controlled. The numbers of active fingers are found using two techniques namely using circular profiling and distance transform. The proposed method involves segmentation of the hand region from the acquired data. Then the centroid of the segmented hand is calculated following which the number of active fingers is found. Then the gesture is recognized. This does not involve storage of data. So controlling the slideshow during a presentation becomes user friendly.

2. SEGMENTATION OF HAND REGION

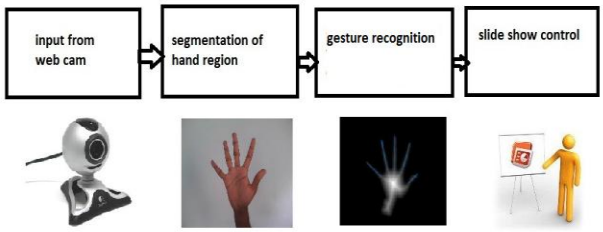

Figure1. Architecture for hand gesture recognition

The general architecture to control the slide show using hand gesture is as shown in Fig 1. The user makes the hand gestures by positioning the hand parallel to the webcam. The video is then processed to extract the hand region. The surrounding must be properly illuminated in order to minimise the error and the background should not contain any element that has skin colour. The resolution of the webcam is kept at 640 x 480 pixels for better quality of video. In real world scenario the background may be made up of different elements. Hence a background subtraction is performed in order to segment the hand region from other regions. The video obtained through webcam is in RGB colour model. This video is converted to HIS colour model because the regions which belong to skin can be easily identified in HSI model. Following this, the rules

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for skin segmentation are applied. The values for hue and saturationmust be between 0.4 to 0.6 and 0.1 to 0.9 Respectively 0.4<H<0.6 and 0.1<S<0.9

The regions with in the range of (1) are detected as skin and applying the above rule results in a binary image. The skin regions are represented using white colour and all other non-skin regions are black. The largest connected region which is detected as skin is taken as the hand region. This gives the segmented hand region and this is the region of interest. The recognition of the gestures depends on this region. The skin segmentation for both circular profiling method and distance transform is the same. But while using distance measure two large connected skin regions are identified to detect two hands.

Capture the input: The first step is to capture the live Video stream from the camera.Camera has no infrared filter thus making it perfect to capture images which even during low light conditions. The color markers are identified and the video is converted into picture frames for gesture recognition.

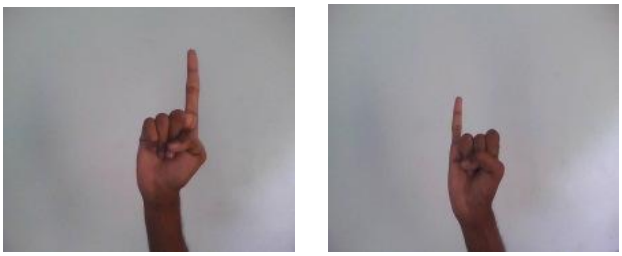
Segmentation of hand: The user makes the hand gestures by positioning the hand parallel to the webcam. The video is then processed to extract the hand region. The surrounding must properly illuminated order to minimize the error and the background should not contain any element that has skin color. The resolution of the webcam is kept at 640 x 480 pixels for better quality of video.

Gesture Recognition: Gesture recognition is a topic in computer science and language technology with the goal of interpretinghuman gestures via mathematical algorithms. Gestures can originate from any bodily motion or state but commonly originate from the face or hand. Current focuses in the field include emotion recognition from the face and hand gesture recognition. Many approaches have been made using cameras and computer vision algorithms to interpret sign language. However, the identification and recognition of posture, gait, proxemics, and human behaviors is also the subject of gesture recognition techniques.
Gesture recognition can be seen as a way for computers to begin to understand human body language, thus building a richer bridge between machines and humans than primitive text user interfaces or even GUIs (graphical user interfaces), which still limit the majority of input to keyboard and mouse. Gesture recognition enables humans to interface with the machine (HMI) and interact naturally without any mechanical devices. Using the concept of gesture recognition, it is possible to point a finger at the computer screen so that the cursor will move accordingly. This could potentially make conventional input devices such as mouse, keyboards and even touch-screens redundant. Gesture recognition can be conducted with techniques from computer vision and image processing.

3. CONTROL THE SLIDESHOW USING HAND GESTURES

Since the recognition of gesture depends purely on the number of active fingers any finger can be used to denote a count. Only the count value of the active fingers is taken as input. So the user can feel free to represent a count irrespective of the finger.

Hence value one denoted by the user using the index finger or thumb will be the same as shown in Fig. 6 (a) and (b).



(a) (b)

Figure2. (a) And (b) various gestures to represent number one

The slideshow is controlled by taking the finger count that is calculated using distance transform, as input from the user. The gestures used to control the slide show are mentioned in Table .When both the hands are used to represent the number of the slide to which the user need to navigate, first both hands are used to represent the first digit of the number and then both thehands are closed. After this both hands are used again to represent the next digit of the slide number.

No of hand	Finger count	Functions
One hand	0	Transition from one gesture to another
One hand	1	Next slide
One hand	2	Previous slide
One hand	3	Slide show
One hand	4	Stop slide show
Two hand	Sequence of one digit numbers	Go to specified slide number

4. CONCLUSION

This paper deals with two algorithms in order to recognize the hand gestures and also compares their efficiencies. Both the algorithms suggest an alternative presentation technique to control PowerPoint presentation using bare hands. The proposed methods do not require any training phase to identify the hand gestures. Hence does not require storage of images in database to recognize the hand gestures. The hand gestures are recognized based on number of active fingers used to represent a gesture. So gestures can be made using any finger. The number of active fingers identified using distance transform method is less time consuming when compared to that of circular profiling method. Moreover both hands can be used in distance transform method and the slide show can be controlled effectively when this method is used. Also the advantage with this method is that the user can go to the desired slide by making gesture using both hands and this is not possible in circular profiling method. Usage of hand

gestures can be extended to control real time applications like VLC media player, paint, pdf reader etc.

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