Real Time Hand Gesture Recognition System

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Abstract— Human-machine interfaces are playing a role of growing importance as computer technology continues to evolve. Keyboards have been replaced by handwriting recognition in Palm and Pocket PC PDAs. Motivated by the desire to provide users with an intuitive gesture input system, we developed a system Human Gesture Recognition to recognize hand gestures representations. Gesture refers to a particular pose and/or movement of the body parts, such as hand, head, face etc., so as to convey some message. Accordingly, one important direction of research in gesture recognition is concerned with hand gestures formed by different hand shapes, positions, orientations and movements. While static hand gestures are modeled in terms of hand configuration, as defined by the flex angles of the fingers and palm orientation, dynamic hand gestures include hand trajectories and orientation in addition to these. So, appropriate interpretation of dynamic gestures on the basis of hand movement in addition to shape and position is necessary for recognition.

Key words: Gesture, Blob Detection, Hue, Saturation, Value

I. INTRODUCTION

Human Gesture Recognition is designed in order to cater the need of fast growing world to minimize the hardware caring burden. It is basically prevents from carrying desktop, laptop or any other devices without any carrying load.

A. Existing Systems

Now a days the Microsoft surface, sticky notes, touch screen, multi touch screen etc. technologies are present but, then cannot fulfill all the requirements of the user means the Microsoft surface have no portability, as sticky notes also fails when we want to take out some image .In market there are the touch screen devices are present but, they are not as fast as the sixth sense, they requires the more time for the processing. So that, these devices are less user-friendly.

B. Problem Solution

Sixth sense technology can able to provide the wearable digital device which can able to solve the problems faced by present technologies.

C. Need of Project

User must have to wear the color bands on finger tips. It is crucial for working of the project. And also camera, projector and smart phone are required.

D. Project Goal

The main goal of project is to stop traditional machine seat out system and to carry the digital world without any limitation.

E. Project Objectives

There are following objectives meet by project.

1) To provide user wearable device which can fulfill all the requirements of the desktop, laptop and any other communicative device?
2) To avoid traditional machine seat out system.
3) For this surface does not matter.
4) To provide user more portable device.
5) If you are using the sixth sense technology then, you can get any information of anything around you.

F. Project Scope

The sixth sense technology allows users to use the wearable computer and that can be operated by the human gestures. If user does not have any laptop or desktop even though user can able to do operation of these devices very easily by sixth sense technology.

II. ALGORITHMS

A. Blob Detection Algorithm

In the area of computer vision, 'blob detection' refers to visual modules that are aimed at detecting points and/or regions in the image that are either brighter or darker than the surrounding. There are two main classes of blob detectors based on derivative expressions and in the intensity landscape. With the more recent terminology used in the field, these operators can also be referred to as interest point operators, or alternatively interest region operators. There are several motivations for studying and developing blob detectors. One main reason is to provide complementary information about regions, which is not obtained from edge detectors or corner detectors. In early work in the area, blob detection was used to obtain regions of interest for further processing. These regions could signal the presence of objects or parts of objects in the image domain with application to object recognition and/or object tracking. In other domains, such as histogram analysis, blob descriptors can also be used for peak detection with application to segmentation. Another common use of blob descriptors is as main primitives for texture analysis and texture recognition. In more recent work, blob descriptors have found increasingly popular use as interest points for wide baseline stereo matching and to signal the presence of informative image features for appearance-based object recognition based on local image statistics. There is also the related notion of ridge detection to signal the presence of elongated objects.

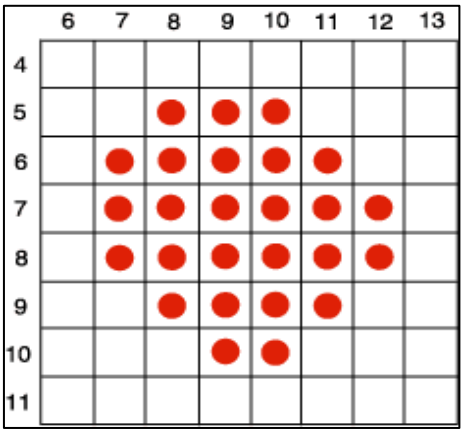


Fig. 2.1.1: Blob

Fig 2.1.1 shows a sample blob located between rows four through 11 and columns six through 13. By borrowing a technique from calculus, you can easily determine the center of the blob's mass. The technique involves counting the number of pixels in each row and column and multiplying the pixel counts by the respective row or column numbers, as indicated in Tables 1 and 2. The sum of all the row products is divided by the total number of pixels in the blob to find the center row. The row value can be calculated in table no 2.1.1

Row	Pixels per row	Product
4	0	0
5	3	15
6	5	30
7	6	42
8	6	48
9	4	36
10	2	20
11	0	0
Total		191

Table 2.1.1: Row Value

The table 2.3 shows the column value of the blob which is shown in fig 5.1.1

Column	Pixels per column	Product
6	0	0
7	3	21
8	5	40
9	6	54
10	6	60
11	4	44
12	2	24
13	0	0
Total		243

Table 2.1.2: Column value

The same method is used to find the center column. Figure 2.1.2 indicates where the center of the blob is located. You may think, "Hey James, that's not the center," but I encourage you to make up your own example and try the method. You'll see that it really works.

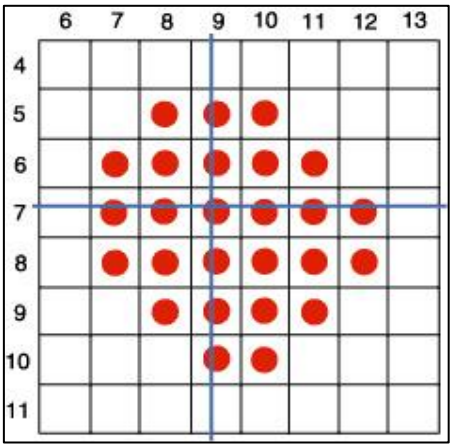


Fig. 2.1.2: Center of blob

Time complexity of blob algorithm is O (n^2).

B. HSV Model

The algorithm is quite simple. The idea is that an image is converted into the HSV color plane, so that it is less susceptible to variations in shades of a similar color. Then a tolerance mask is applied over the converted image, especially in the hue and saturation plane. The resulting image is a binary image which can be quite noisy, depending on the quality of the input image. To clean up this noise, the binary image is then run through a convolution phase,

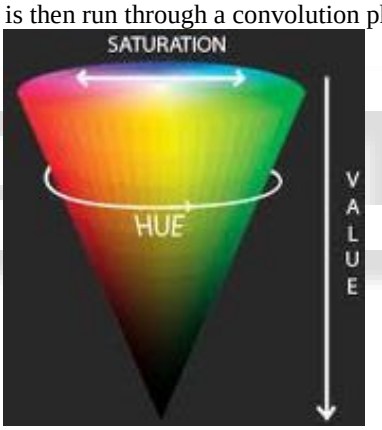


Fig. 2.2.1: HSV Colour Model

HSV (Hue, Saturation and Value) – defines a type of color space. It is similar to the modern RGB and CMYK models. The HSV color space has three components: hue, saturation and value. 'Value' is sometimes substituted with 'brightness' and then it is known as HSB. The HSV model was created by Alvy Ray Smith in 1978. HSV is also known as the hex-cone color model.

1) Hue

In HSV, hue represents color. In this model, hue is an angle from 0 degrees to 360 degrees.

2) Saturation

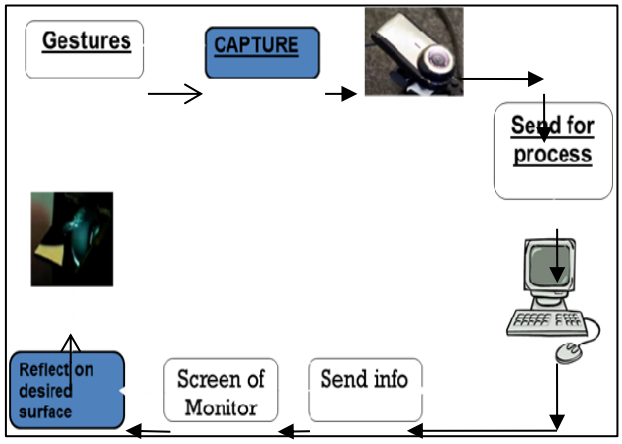
Saturation indicates the range of grey in the color space. It ranges from 0 to 100%. Sometimes the value is calculated from 0 to 1. When the value is '0,' the color is grey and when the value is '1,' the color is a primary color. A faded color is due to a lower saturation level, which means the color contains more grey.

3) Value

Value is the brightness of the color and varies with color saturation. It ranges from 0 to 100%. When the value is '0′

the color space will be totally black. With the increase in the value, the color space brightness up and shows various colors.

III. PROPOSED BLOCK DIAGRAM



IV. APPLICATIONS & ANALYSIS

a) Virtual Reality

Gestures for virtual and augmented reality applications have experienced one of the greatest levels of uptake in computing. Virtual reality interactions use gestures to enable realistic manipulations of virtual objects using ones hands, for 3D display interactions or 2Ddisplays that simulate 3D interactions

b) Games

When, we look at gestures for computer games. Freeman tracked a player's hand or body position to control movement and orientation of interactive game objects such as cars. Konrad et al. [10] used gestures to control the movement of avatars in a virtual world, and PlayStation 2 has introduced the Eye Toy, a camera that tracks hand movements for interactive games

c) Sign Language

Sign language is an important case of communicative gestures. Since sign languages are highly structural, they are very suitable as test beds for vision algorithms [12]. Atthe same time, they can also be a good way to help the disabled to interact with computers. Sign language for the deaf (e.g. American Sign Language) is an example that has received significant attention in the gesture literature.

Following are the application with gesture required for that:

A. Frame Gesturing

In this application we capture photo, simply making following gesture in front of camera, after specified time the photo automatically captured by camera and save it on specified path.

B. Clock

In this application system show the clock on any surface, following gestures are required to show and hide clock.

a) Clockwise to Show Clock

b) Anticlockwise to Hide Clock

C. Audio/Video Player

In this application we interface audio/video player then using following gesture control the application.

a) Play

b) Pause

c) Next Track

d) Previous Track

V. FUTURE SCOPE

The Human Gesture Reorganization by sixth sense is used in many ways in our society. The sixth sense can be used in following ways in future. In medical application, when there is the problem in the delivery of woman then at that time without doing any operation we can change the position of child by performing the gestures on the stomach so that, the pain of that woman can be low down at particular level. In security system, by providing the gesture as the password we can avoid the damage of that device due to frequent use of it.

The sixth sense is boon for the handicapped, physically challenged people because due to this there absence of the sense can be fulfilled. We can be able to carry the digital world with us, so that we are always stay touchup with the digital world.

So, sixth sense is fastest growing technology in not only in IT sector but also in the automobile industries, medical applications, education sector and in security etc.

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