International Journal Of Advanced Engineering & Innovative Technology (IJAEIT)
ISSN: 2348 7208

IMPACT FACTOR: 1.04

Multi-Gesture Interaction System Using Color-Strip

Shubham Shah,Nagraj Poojari,Siddesh Morde,Nikhil Sutar

Under the Guidance Of Prof. S.B.Madankar

Abstract –Gestures are a major form of human communication. Hence gestures are found to be an easy way to interact with computers, as they are already a natural part of how we communicate and what we express .A primary goal of gesture recognition research is to create a system which can identify specific human gestures and use them to convey information or for device control. A primary goal of gesture recognition is to create a system which can identify specific human gestures whether it is a hand gesture or a face gesture and use them to convey information for device control and by implementing real time gesture recognition a user can control a computer by doing a specific gesture in front of a video camera linked to the computer .This project covers various issues like what are gesture, their classification, their role in implementing a gesture recognition system, system architecture concepts for implementing a gesture recognition system, major issues involved in implementing a simplified gesture recognition system, exploitation of gestures in experimental systems, importance of gesture recognition system, real time applications and future scope of gesture recognition system and performs the operations on application like calculator, power point slideshow, music-player, word pad etc.

Key words: Gestures, Multi-Gesture, Color-Strip

1. INTRODUCTION

Interactive presentation systems use advanced Human Computer Interaction (HCI) techniques to provide a more convenient and user-friendly interface for controlling presentation displays, such as page up/down page next/previous pause/play controls in a slideshow. Compared with traditional mouse and keyboard control, the presentation experience is significantly improved with these techniques. Hand gesture has wide-ranging applications [1]. In this study, we apply it to an interactive presentation system to create an easy-to-understand interaction interface. Hand gesture recognition provides an intuitive and immersive interaction in user interface applications compared with traditional interaction media such as mouse and joystick due to their ease and naturalness. Recognizing hand gestures in video is a complex problem; it requires segmenting and tracking hands in complex scenes with varying background and lighting conditions as well as recognizing the same gesture with varying durations and also for seamless interaction, Nowadays, gestures still are naturally used by many people and especially are the most major and nature interaction way for deaf, blind, mute people.

Shubham Shah,Nagraj Poojari,Siddesh Morde,Nikhil Sutar, B.E Information Technology,Padmabhooshan Vasantdada Patil Institute of Technology,Pune
Prof. S.B.Madankar Professor, Information Technology,Padmabhooshan Vasantdada Patil Institute of Technology,Pune

In recent years, the gesture control technique has become a new developmental trend for many human-based electronics products, such as computers, televisions, video games, mobile phones, communication devices. This technique let people can control these products more naturally, intuitively and easily.

2. EXISTING SYSTEM

In recent decades, due to computer software and hardware technologies of continuous innovation and breakthrough, the social life and information technology have a very close relationship in the twenty-first century. In the future, especially the interfaces of consumer electronics products (e.g. smart phones, games) will have more and more functions and be complex. How to develop a convenient human-machine Interface (Human Machine Interaction/Interface, HMI) for each consumer electronics product has become an important issue. The traditional electronic input devices, such as mouse, keyboard, and joystick are still the most common interaction way. However, it does not mean that these devices are the most convenient and natural input devices for most users. Since ancient times, gestures are a major way for communication and interaction between people. People can easily express the idea by gestures before the invention of language. Nowadays, gestures still are naturally used by many people and especially are the most major and nature interaction

way for deaf people [1]. Microsoft also working on a technique of gesture recognition for blind and deaf people. In recent years, the gesture control technique has become a new developmental trend for many human-based electronics products, such as computers, televisions, and games. This technique let people can control these products more naturally, intuitively andIn case of existing system. The objective of this paper is to develop a real time hand gesture recognition system using color strip based on adaptive color HSV model and motion history image (MHI). By adaptive skin color model, the effects from lighting, environment, and camera can be greatly reduced, and the robustness of hand gesture recognition could be greatly improved. [6]

3. PROBLEM STATEMENT

"Multi-Gesture Interaction Using Color-strip" is based on concept of Image processing. In recent year there is lot of research on gesture recognition using kinect sensor on using HD camera but camera and kinect sensors are more costly. This paper is focus on reduce cost and improve robustness of the proposed system using simple web camera.

4. PROPOSED SYSTEM

Most gesture recognition methods usually contain three major stages. The first stage is the object detection. The target of this stage is to detect hand objects in the digital images or videos. Common image problems contain unstable brightness, noise, poor resolution and contrast. The better environment and camera devices can effectively improve these problems. However, it is hard to control when the gesture recognition system is working in the real environment or is become a product. Hence, the image processing method is a better solution to solve these image problems to construct an adaptive and robust gesture recognition system. The second stage is object recognition. The detected hand objects are recognized to identify the gestures. At this stage, differentiated features and effective classifiers selection are a major issue in most researches. The third stage is to analyze sequential gestures to identify users' instructs or behaviors.[2]. As we are using color strips to detect the finger tip it will become more easy to get the work done by the computer hardware and software the camera will detect the color more easily and efficiently we can use any color strip but first we have to describe this color to the application first. Here we have used only red and green color strip hence camera will recognize only this colors and not others.

5.SYSTEM REQUIREMENT

A) Domain:

Image processing and artificial neural network.

B) Software Interfaces:

Operating System : Windows
Language : JDK 6
Data Base : My Sql
Front End : Java
Back End : MySql

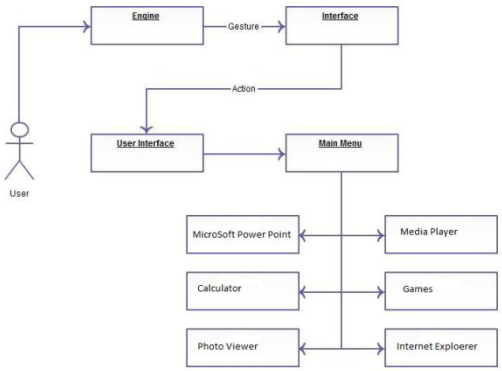
Java (JDK 6)

Java is a general purpose programming language with a number of features that make the language well suited for use on the World Wide Web. Small Java applications are called Java applets and can be downloaded from a Web server and run on your computer by a Java-compatible Web browser, such as Netscape Navigator or Microsoft Internet Explorer.[5]

MySql Server 5.1

MySQL is a popular choice of database for use in web applications. Many programming languages with language-specific APIs include libraries for accessing MySQL databases. MySQL is primarily an RDBMS and ships with no GUI tools to administer MySQL databases or manage data contained within the databases. Users may use the included command line tools,[citation needed] or download MySQL front-ends from various parties that have developed desktop software and web applications to manage MySQL databases, build database structures, and work with data records.

6. SYSTEM ARCHITECTURE:



During implementation one thing was clear that a system is going to be developed which can capture a hand gesture performed by the user in front of web Cam, this capture image is then proceed to identify the valid gesture through specific algorithm & execute the

corresponding operation.The first step of our system is to separate the potential hand pixels from the non-hand pixels. This can be done by background subtraction scheme which segments any potential foreground hand information from the non-changing background scene. At the system startup, a pair of background images is captured to represent the static workspace from camera view. Subsequent frames then use the appropriate background image to segment out moving foreground data. [4] After background subtraction, the process of skin segmentation is done. Here, a histogram-based skin classifier assigns each of the RGB pixels in the training set to either a 3D skin histogram or non-skin histogram. Given these histograms, the probability is computed that a given RGB color belongs to the skin or non-skin classes. The skin segmentation process outputs an image which is ready for detection of color tapes in the finger. For this an algorithm based on HSV color space is used which is very effective to select acertain color out of an image. The idea is to convert the RGB pixels into the HSV color plane, so that it is less affected to variations in shades of similar color. Then, a tolerance mask is used over the converted image in the saturation and hue plane. The resulting binary image is then run through a convolution phase to reduce the noise introduced.[4]

6.2 Mouse Cursor Movement

We are using the index finger with yellow colour tape as a cursor controller to control mouse cursor movement. Two different approaches for moving the mouse cursor can be used. The first method is position mapping the index finger on a camera screen to a desktop screen position. But this method incurs a problem. If the resolution of the desktop window is greater than the camera resolution, then the cursor position cannot be accurate because while converting camera resolution to the desktop window resolution, intermediate values are lost. The expected ratio of jumping pixel is up to 4 pixels. The second method is known as weighted speed cursor control. Here the difference of the finger of the current image and the previous image is found and the distance between the two is computed. Next, the mouse cursor is moves fast if the gap between the two finger images (current and previous frame) is far or, if the gap is close then the cursor moves slow. There is a problem associated with this algorithm also. Some machines which cannot achieve image processing more than 15 fps do not work smoothly because computing the image center and the hand shape takes time. In this paper, we are concerning the first method which uses absolute position of finger tips because it is more accurate than the second method.[4]

6.3. Click Events

The click events for the mouse are mapped with different hand gestures. The idea focuses on processing the distance between the two coloured tapes in the fingers. The click events are detailed in the subsequent sub points.[4]

6.4 Workflow of System

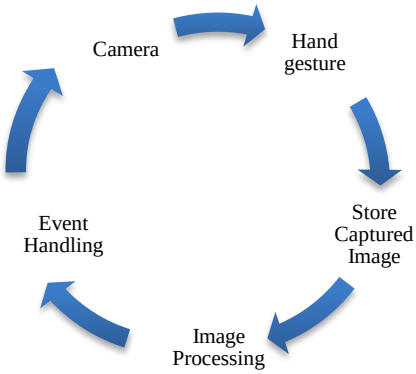


Fig. Workflow of System

6.4.1. Human Generated Gesture: As a first step of implementation user will show one gesture. The gesture should be constant for some period of time, which is necessary for dynamic processing. These gestures should be already defined as valid gesture for processing. [7]

6.4.2. Web Camera The purpose of web camera is to capture the human generated hand gesture and store it in memory. The package called Java Media Framework is used for storing image in memory and again calling the same program after particular interval. [7]

6.4.3. Image Processing Algorithm: This carries the major portion of implementation. First the captured image is preprocessed by techniques like making binary, zooming, cropping and standard resizing. Such preprocessed image is given to the image-processing algorithm. The algorithm will count the number of fingers shown by user, which will work as input for next processing. [7]

6.4.4. Event Handling: Once the gesture is identified the appropriate command for it will be executed. This includes opening, traversing my computer contents as per user requirement. Shortcut for applications like notepad, WordPad are also provided. Other control commands include shutdown and restart facilities using gestures. [7]

6.4.5. Back To Capturing Gestures: Gesture recognition is a dynamic process so once particular gesture is identified and appropriate control command is executed it will again go to capture next image and process it accordingly. [7]

7. Design:

The basic fundamentals of hand gesture recognition system is divided into three part gesture capturing, processing of gesture, reflecting output. The system flow in the following step.

1. At very first user will log-in into the system and get the access.

2. The system will get connected to the web-cam for capturing the gesture from the user

3. The user will load the gesture by any of the method e.g. hand gesture or color strip

4. Loaded gesture will further proceed for recognition which will be validated from datasets stored in database

5.The system will reflect the appropriate message after recognition process to the end user

6.And provided user with the access of the various requested application like mp3 player, Microsoft office, calculator etc.

1. **Algorithm:**
2. Point Pattern Matching
3. For finding the validity ratio Point Pattern Matching algorithm is used.
4. C - Denotes the center points
5. D - Denotes the distance mask
6. T - Denotes the No. of test image to match
7. M - Denotes the No. of Matched Points 1, 2, 3 are the key points.
8. The procedure to find the Validity ratio of One Database Image versus Test Input Image.

The working of point pattern matching algorithm is as follows:

1. Take a test image

2. Pre process the test image.

3. Initialize the distRatio = 0.65 and threshold= 0.035

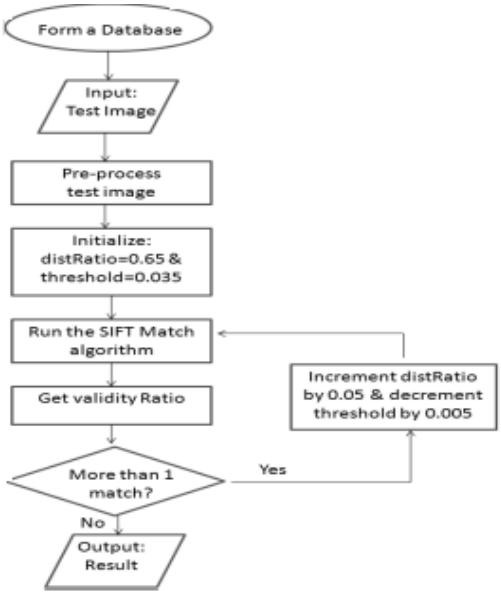
4. Run the SHIFT match algorithm

5. Key point matching starts its execution by running the threshold. It gets the key point matched between test and all 36 trained images. We get the validity ratio.

6. Check that we got more than one result or not.

7. If we get more than1 result then increment the SHIFT dist Ratio by 0.05 and threshold by 0.005 and repeat the steps from 4 to 7.

8. If we get only one result then display the result.



2 .Finger-Earth Mover's Distance: In [8], Rubner *et al.* presented a general and flexible metric, called Earth Mover's Distance (EMD), to measure the distance between signatures or histograms. EMD is widely used in many problems such as content-based image retrieval and pattern recognition [9], [10]. EMD is a measure of the distance between two probability distributions. It is named after a physical analogy that is drawn from the process of moving piles of earth spread around one set of locations into another set of holes in the same space. The location of earth pile and hole denotes the mean of each cluster in the signatures, the size of each earth pile or hole is the weight of cluster, and the ground distance between a pile and a hole is the amount of work needed to move a unit of earth. To use this transportation problem as a distance measure, i.e., a measure of dissimilarity, one seeks the least costly transportation—the movement of earth that requires the least amount of work.

8. ADVANTAGES

- Reduce external Interface : he Advantage of System is to Reduce External Interface like Mouse And Keyboard.
- High Portability : The proposed system reduce the working of external interface like keyboard and mouse so it makes it high portable
- Easy to handle: As people are tend to use gesture therefore using it with a machine is also simple.

- Less cost: When use in quantity on numbers it will result in less cost because of less requirement of hardware component.

9. FUTURE SCOPE

- To optimize time complexity.
- By adding more gestures, we can handle all My Computer operations like Cut, Copy, Paste and Undo etc.
- By integrating our system with voice recognition system we can embed it in ROBOTS
- We are also able to handle image processing and event handling accordingly.

10. CONCLUSION

The proposed work will help to eliminate the traditionally completely. It only require web-camera to capture I/P image. This would lead to a new generation of human computer interaction in which no physical contact with device is needed. Anyone can use the system to operate the computer easily, by using gesture command.

11. REFERENCES

[1]Robust Part-Based Hand Gesture Recognition Using Kinect Sensor Zhou Ren, Junsong Yuan, Member, IEEE, Jingjing Meng, Member, IEEE, and Zhengyou Zhang, Fellow, IEEE, 15, AUGUST 2013

[2] A Fast Gesture Recognition Scheme for Real-Time Human-Machine Interaction Systems . Ching-Hao Lai* Smart Network System Institute Institute for Information Industry Taipei City, Taiwan , 2010

[3] Real-Time Hand Gesture Recognition System for Daily Information Retrieval from Internet
IEEE Fourth International Conference on Ubi-Media Computing

[4] Mouse Simulation Using Two Coloured Tapes Kamran Niyazi1, Vikram Kumar2, Swapnil Mahe3 and Swapnil Vyawahare4 Department of Computer Engineering, AISSMS COE, University of Pune, India

[5] Real-Time Hand Gesture Detection and Recognition Using Bag-of-Features and Support Vector Machine

Techniques. ong yao,Xin Zang,Xiang Bai,Member IEEE, Wenyu Liu ieee transactions on instrumentation and measurement, vol. 60, no. 11, november 2011.

[6] A Hand Gesture Based Interactive Presentation System Utilizing Heterogeneous Cameras Bobo Zeng, Guijin Wang**, Xinggang Lin

[7] Hand Gesture Based Interactive Presentation System Utilizing Heterogeneous Cameras Bobo Zeng, Guijin Wang**, Xinggang Lin Department of Electronic Engineering, Tsinghua University, Beijing 100084, China

[8] Y. Rubner, C. Tomasi, and L. J. Guibas, "The earth mover's distance as a metric for image retrieval," *Int. J. Comput. Vision*, vol. 40, pp. 99–121, 2000.

[9] R. Datta, D. Joshi, J. Li, and J. Z. Wang, "Image retrieval: Ideas, influences, and trends of the new age," *ACM Comput.Surv.*, vol. 40, pp. 1–60, 2008.

[10] J. Zhang, S. Lazebnik, and C. Schmid, "Local features and kernels for classification of texture and object categories:Acomprehensive study," *Int. J. Comput. Vision*, vol. 73, pp. 213–238, 2007.