Hand Gesture Recognition System Using Camera

Viraj Shinde, Tushar Bacchav, Jitendra Pawar, Mangesh Sanap
B.E computer engineering,Navsahyadri Education Society'sGroup of Institutions,pune.

Abstract -

In this paper, we focus on using pointing behavior for a natural interface, Hand gesture recognition based human-machine interface is being developed vigorously in recent years. Due to the effect of lighting and complex background, most visual hand gesture recognition systems work only under restricted environment. To classify the dynamic hand gestures, we developed a simple and fast motion history image based method. In recent years, the gesture control technique has become a new developmental trend for many human-based electronics products. This technique let people can control these products more naturally, intuitively and conveniently. In this paper, a fast gesture recognition scheme is proposed to be an interface for the human-machine interaction (HMI) of systems. This paper presents some low-complexity algorithms and gestures to reduce the gesture recognition complexity and be more suitable for controlling real-time computer systems.

Keywords:-

Keywords-Gesture recognition; human-machine interaction
(HMI)

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 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. In this study, we apply it to an interactive presentation system to create an easy-to-understand interaction interface.

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 and infota1inment systems) will have more and more functions and be complex. How to develop a convenient human-machineInterface (HumanMachine 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]. 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 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**

"Hand Gesture Recognition Using Camera " 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. Many environment and image problems are needed to solve at this stage to ensure that the hand contours or regions can be extracted precisely to enhance the recognition accuracy. 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]

5.**System Requirement**

Deliverables:

Software:
net bean 7.2,
JMF version 1.1,
JDK1.6, MySQL.

Domain:
Image processing

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:

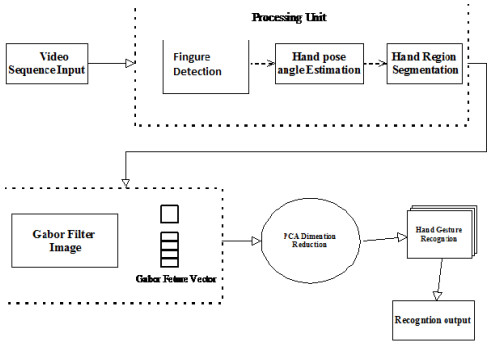

Fig. System Architecture

The proposed architecture consists of THREE stages:

(1) Hand detection
(2) Hand gesture recognition
(3) Finger detection

Now we introduce our part-based hand gesture recognition system. Which illustrates the framework, which consists of two major modules: hand detection and hand gesture recognition.

Hand Detection:

we use camera as the input device, which captures the color image and the depth map at 640*480 resolution. In order to segment the hand shape, we locate the hand position using the hand tracking function. Then, by thresholding from the hand position with a certain depth interval, a rough hand region can be obtained. Second, we require the user to wear a black belt on the gesturing hands wrist, in order to more accurately segment the hand shape. After detecting the black color pixels, we use RANSAC to a line to locate the black belt. The hand shape is generally of 100*100 pixel resolution, with possibly severe distortions. After detecting the hand shape, we represent it as a time-series curve. Such a shape representation has been successfully used for the classification and clustering of shapes. The time-series curve records the relative distance between each contour vertex and a center point. We define the center point as the point with the maximal distance after Distance Transform on the shape (the cyan point); and the initial point (the red point) is according to the RANSAC line detected from the black belt (the green line). In our time series representation, the horizontal axis denotes the angle between each contour vertex and the initial point relative to the center point, normalized by 360 . The vertical axis denote the Euclidean distance between the contour vertices and the center point, normalized by the radius of the maximal inscribed circle. the time-series curve captures nice topological properties of the hand, such as the finger parts.

Hand Gesture Recognition:

1. Finger earth mover distance:

Rubner et al. presented a general and exible metric, called Earth Movers 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. 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. References and applied EMD to shape matching and contour retrieval, which represents the contour by a set of local descriptive features and computes the set of correspondences with minimum EMD costs between the local features. However, the existing EMD-based contour matching algorithms have two deficiencies when applied to hand gesture recognition: Two and shapes mainly in global features while not local features. The fingers (global features) are their major difference. Besides, the large number of local features slows down the speed of contour matching. Therefore, it is better to consider global features in ontour matching. EMD allows for partial matching, i.e., a signature and its subset are considered to be the same in EMD measure. Our Finger-EarthMovers Distance(FEMD)can address these two deficiencies of the contour matching methods using EMD. Different from the EMD-based algorithm which considers each local feature as a cluster, we represent the input hand by global features (the finger clusters).And we add penalty on empty holes to alleviate partial matches on global features.

Finger Detection

In order to measure the FEMD distance between hand shapes, we need to represent the hand shape as a signature with each finger as a cluster, namely, to detect the finger parts from the hand shape. We propose two finger detection methods to obtain the finger parts from the hand shapes.

Now we introduce these two algorithms**:**

1) Near-Convex Decomposition

2) Thresholding decomposition

Near-Convex Decomposition:

We note that the fingers have a common geometric property: they are near-convex parts of the hand shape. Therefore, we adjust the Minimum Near- Convex Decomposition (MNCD) proposed in to a finger detection method: The goal of the first term in the objective function is to reduce the redundant parts that are not fingers, and the second term is to improve the visual naturalness of the decomposition. Parameter balances the flounce between the first and the second term. Thresholding decomposition:

Although near-convex decomposition algorithm can detect the finger parts accurately,

it is generally complexly formulated and cannot be solved in real time. Thus we propose an alternative finger detection methods that are more efficient, named thresholding decomposition. As mentioned before, the time-series curve reveals a hands topological information well. each finger corresponds to a peak in the curve. Therefore, we can apply the height information in time-series curve to decompose the fingers. Specifically, we define a finger as a segment in the time series curve, whose height is greater than a threshold . In this way, we can detect the fingers fast. However, choosing a good height threshold is essential[1].

6.2 Workflow of System

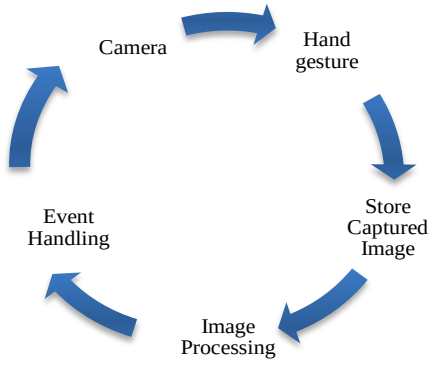

Fig. Workflow of System

Algorithm:

1.Point Pattern Matching

For finding the validity ratio Point Pattern Matching algorithm is used.

C - Denotes the center points

D - Denotes the distance mask

T - Denotes the No. of test image to match

M - Denotes the No. of Matched Points 1, 2, 3 are the key points.

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 distRatio 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.

7.Advantages

- Reduce external Interface

The 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

8. 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.

9.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]Wearable Sensor-Based Hand Gesture and Daily Activity Recognition for Robot-Assisted Living
IEEE TRANSACTIONS ON SYSTEMS, MAN, AND CYBERNETICSPART A: SYSTEMS AND HUMANS, VOL. 41, NO. 3, MAY 2011.

[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