

A REVIEW ON HAND GESTURES RECOGNITION

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Abstract— Gestures are a powerful means of communication among humans. Gesture recognition is the process of recognizing and interpreting a stream continuous sequential gesture from the given set of input data. Primary Concern in hand gesture recognition is that it could be possible for users to communicate with computerized equipment without need for external control devices. Another advantage is that the user not only can communicate from a distance, but need have no physical contact with the computer. According to survey almost 40% of all gestures are done with one hand and multiple hands at 20% and the rest are distributed between the other body parts. In this method bare hand gestures are recognizing using dynamic vision sensor (DVS) camera. DVS is different from conventional cameras. DVS cameras only respond to pixels with temporal luminance differences, which can greatly reduce the computational cost of comparing consecutive frames to track moving object.

Keywords— Gesture recognition, gesture.

I. INTRODUCTION

Gestures are expressive, meaningful body motions, physical movements of the fingers, hands, arms, head, face, or body with the intent to convey information or interact with the environment Hand gesture has been one of the most common and natural communication media among human being. Hand gesture recognition research has gained a lot of attentions because of its applications for interactive human-machine interface and virtual environments. Computer is used by many people either at their work or in their spare-time. Special input and output devices have been designed over the years with the purpose of easing the communication between computers and humans, the two most known are the keyboard and mouse. Every new device can be seen as an attempt to make the computer more intelligent and making humans able to perform more complicated communication with the computer. This has been possible due to the result oriented efforts made by computer professionals for creating successful human computer interfaces. As the complexities of human needs have turned into many folds and continues to grow so, the need for Complex programming ability and intuitiveness are critical attributes of computer programmers to survive in a competitive environment. Humans and gestures go back a

long way. Gestures are ingrained so deeply in humans that they are considered part of language and expression. It is hard to settle on a specific useful definition of gestures due to its wide variety of applications and a statement can only specify a particular domain of gestures. Many researchers had tried to define gestures but their actual meaning is still arbitrary.

II. HUMAN WITH GESTURES

Humans are various forms of expressions like speech, facial expression, and bodily movements to communicate. Humans and gestures go back a long way. Studies have shown that humans have a natural tendency to use gestures when they communicate. Gestures are ingrained to deeply that they considered part of language and expression. An example of this is clearly seen when people use hand gestures when they talk on the phone even though they know that they cannot be seen. Interestingly, studies also show how babies quickly learn to use conversational gestures like waving a hand. Due to the widespread use and importance of gestures in everyday human interaction, a natural extension would be to incorporate some aspects of gestural interaction in computer systems.

III. ARCHITECTURE OF HAND GESTURE RECOGNITION

In following figure 1 most of the researchers classified gesture recognition system into mainly three steps after acquiring the input image from camera,videos or even data glove instrumented device. These steps are: Extraction method, Feature extraction, and Classification or recognition as illustrated in fig1.

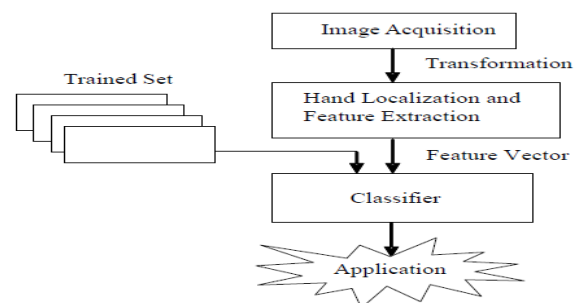


Fig1: Block diagram of gesture recognition system[1]

Image capture phase is to acquire an image, or a sequence of images, which is then processed in the next phases. The capturing is mostly done using a single camera with a frontal view of the person's hand, which performs the gestures. The basic aim of this phase is to optimally prepare the image obtained from previous phase in order to extract the features in next phase. How an optimal result looks like depends mainly on the next step. The aim of this phase is to find and extract features that can be used to determine the meaning of a given gesture. This phase extracts features for classification. The classification represents the task of assigning a feature or set of features to some predefined classes in order to recognize the hand gesture. In previous years several classification methods have been proposed and successfully tested in different recognition systems. In general, a class is defined as a set of reference features that were obtained during the training phase of the system using a set of training images. Therefore the classification mainly consists of finding the best matching reference features for the features extracted in the previous phase.

IV. REQUIREMENT OF HAND GESTURES

In this section it will define requirements for real time human computer interaction with bare hands that will guide our implementation.

A. Functional Requirement

Functional requirements can be described as the collection of services that are expected from system. For software system these services can cover several layers of abstraction. In our context, only the basic services are of interest. We identify three essential services for vision-based human computer interaction: Detection, Identification and Classification or Tracking. We will briefly present the three services and describe how they are used by our envisaged application.

- Detection

Detection determines the presence and position of a class of objects in the scene. A class of objects could be body parts in general, faces, hands or fingers. The point where user delivers a throw should be detected first. And this point is called as Deliver point. To find the delivery point track number of events for each frame and if the number of events in frame is less than the given threshold N_{DLVR} , the frame is regarded as a delivery point.

- Identification

The goal of identification is to decide which object from given class of objects is present in the screen. For bare hand two different identification tasks are potentially interesting:

1. Identification of a certain hand Posture
2. Number of fingers visible

- Tracking

In most cases the identified objects will not rest in the same position over time. If two objects of the same class are moving in the screen, tracking is required to be able to tell which object moved where between two frames. There are two basic approaches to deal with the tracking problem. First it is possible to remember the last known position of an identified object. The second possibility is to rerun the identification stage for each frame.

V. GESTURE CLASSIFICATION

Hand gesture classified in to four categories: Static, Dynamic, dynamic gesture with posture, and object gesture.

Static Gesture: It consists of only hand postures. Static gesture has a qualitative nature because it cannot be measured by any number and can only be observed by its appearance and shape. Therefore, static gesture can convey only specific meaning.

Dynamic Gesture: It consists of only hand motions. In contrast to static gesture, dynamic gesture has a quantitative nature because it can be measured in volume, length or speed. It cannot be observe it by its appearance. Therefore, dynamic gesture can convey only a meaning of motion and direction.

Dynamic gesture with posture: It is a more high level gesture having both static and dynamic elements. In this gesture, a posture acts as a specific transition in during the motion

Object gesture: It is a gesture holding or interacting with object in the environment. This is a one variation of Dynamic gesture with posture where posture is an object because objects also have a qualitative nature, same as a static gesture. We can observe it by its shape, color and other attributes. Object gesture is very important for the gesture interaction in mixed reality.

VI. FORMULATION OF SYSTEM

Tracking moving objects and recognizing gestures using cameras increasingly possible with the growth in computing power. Conventional cameras have a frame based architecture where a series of snapshots is taken constant rate. To track moving object, these consecutive frames are compared to find temporal changes, which is a computationally expensive task. So dynamic vision sensor (DVS) is used which responds to pixels asynchronously that have temporal changes in intensity.

- Step-1) Determine video input frame
- Step-2) Determine DVS video events
- Step-3) Display Event graph
- Step-4) Identify throws as delivery point
- Step-5) Determine frames with noise
- Step-6) Hand extraction
- Step-7) Remove patched from extracted hand

Step-8) Feature Extraction
Step-9) Classification:

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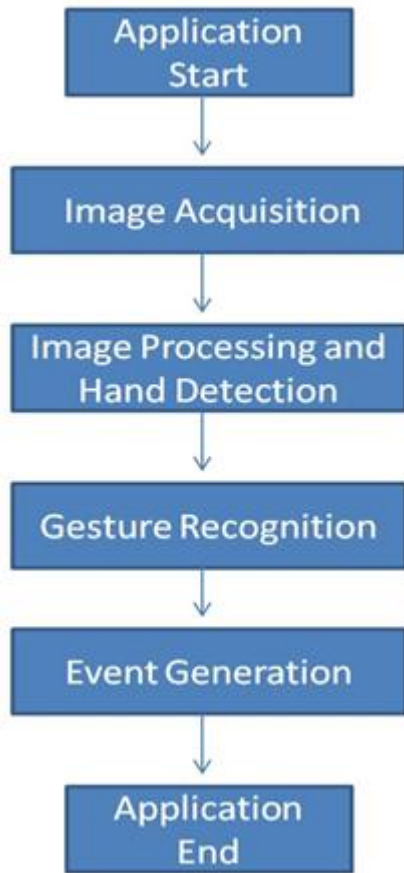


Fig 2. System Flow Chart

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