Gesture recognition technology

Ankita P. Meshram ,Dr.Dinesh Vitthalrao Rojatkar
Student, Asst.Professor
Dept.of Electronics and Telecommunication
Government College of engineering
Chandrapur(MS),India

***ABSTRACT*-Gesture recognition is a topic in Electronics and telecommunication technology with the goal of interpreting human 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.**

Keywords: **Ambient Intelligence Human wits, Hand gesture, Nose tips, Eye detection**

INTRODUCTION

A child being sensed by a simple gesture recognition algorithm detecting hand location and movement

Gesture recognition is a topic in computer science and language technology with the goal of interpreting human 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.

Interface with computers using gestures of the human body, typically hand movements. In gesture recognition technology, a camera reads the movements of the human body and communicates the data to a computer that uses the gestures as input to control devices or applications. For example, a person clapping his hands together in front of a camera can produce the sound of cymbals being crashed together when the gesture is fed through a computer.

Unlike haptic interfaces, gesture recognition does not require the user to wear any special equipment or attach any devices to the body. The gestures of the body are read by a camera instead of sensors attached to a device such as

adata glove. In addition to hand and body movement, gesture recognition technology also can be used to read facial and speech expressions (i.e., lip reading), and eye movements.

The literature includes ongoing work in the computer vision field on capturing gestures or more general human pose and movements by cameras connected to a computer.

LITERATURE SURVEY

Hasan applied multivariate Gaussian distribution to recognize hand gestures using non geometric features.The input hand image is segmented using to different methods ;skin colour based segmentation by applying HSV model and clustering based thresholding technique.Some operations are performed to capture the shape of the hand to exact hand features.

GESTURE RECOGNITION AND PEN COMPUTING:

• In some literature, the term gesture recognition has been used to refer more narrowly to non-text-input handwriting symbols, such as inking on a graphics tablet, multi-touch gestures, and mouse gesture recognition. This is computer interaction through the drawing of symbols with a pointing device cursor (see discussion at Pen computing).

sensors, plus sensors measuring thumb crossover, palm arch, wrist flexion and wrist abduction. (Photo: Virtual Technologies, Inc.)

Once hand pose data has been captured by the gloves, gestures can be recognized using a number of different techniques. Neural network approaches or statistical template used to identify static hand poses, often achieving accuracy rates of better than 95% (Väänänen and Böhm 1993)

GESTURE TYPES

In computer interfaces, two types of gestures are distinguished:

• Offline gestures: Those gestures that are processed after the user interaction with the object. An example is the gesture to activate a menu.

• Online gestures: Direct manipulation gestures. They are used to scale or rotate a tangible object.

Here we can see that the user action is captured by a camera and the image input is fed into the gesture recognition system , in which it is processed and compared efficiently with the help of an algorithm. The virtual object or the 3-d model is then updated accordingly and the user interfaces with machine with the help of a user interface display.

USES

Gesture recognition is useful for processing information from humans which is not conveyed through speech or type. As well, there are various types of gestures which can be identified by computers.

• Sign language recognition. Just as speech recognition can transcribe speech to text, certain types of gesture recognition software can transcribe the symbols represented through sign language into text.

• For socially assistive robotics. By using proper sensors (accelerometers and gyros) worn on the body of a patient and by reading the values from those sensors, robots can assist in patient rehabilitation. The best example can be stroke rehabilitation.

CHALLENGES

There are many challenges associated with the accuracy and usefulness of gesture recognition software. For image-based gesture recognition there are limitations on the equipment used and image noise. Images or video may not be under consistent lighting, or in the same location. Items in the background or distinct features of the users may make recognition more difficult.

The variety of implementations for image-based gesture recognition may also cause issue for viability of the technology to general usage. For example, an algorithm calibrated for one camera may not work for a different camera. The amount of background noise also causes tracking and recognition difficulties, especially when occlusions (partial and full) occur. Furthermore, the distance from the camera, and the camera's resolution and quality, also cause variations in recognition accuracy.

In order to capture human gestures by visual sensors, robust computer vision methods are also required, for example for hand tracking and hand posture recognition or for capturing movements of the head, facial expressions or gaze direction.

UPCOMING NEW TECHNOLOGY

The Sixth Sense De vice:-

SixthSense is a wearable gestural interface device developed by Pranav Mistry, a PhD student in the Fluid Interfaces Group at the MIT Media Lab. It is similar to Telepointer, a neckworn projector/camera system developed by Media Lab student Steve Mann (which Mann originally referred to as "Synthetic Synesthesia of the Sixth Sense"). The SixthSense prototype is comprised of a pocket projector, a mirror and a camera. The hardware components are coupled in a pendant like mobile wearable device. Both the projector and the camera are connected to the mobile computing device in the user's pocket. The projector projects visual information enabling surfaces, walls and physical objects around us to be used as interfaces; while the camera recognizes and tracks user's hand gestures and physical objects using computer-vision based techniques. The software program processes the video stream data captured by the camera and tracks the locations of the colored markers (visual tracking fiducials) at the tip of the user's fingers using simple computer-vision techniques. The movements and arrangements of these fiducials are interpreted into gestures that act as interaction instructions for the projected application interfaces. The maximum number of tracked fingers is only constrained by the number of unique fiducials, thus SixthSense also supports multi-touch and multi-user interaction.

The SixthSense prototype implements several applications that demonstrate the usefulness, viability and flexibility of the system. The map application lets the user navigate a map displayed on a nearby surface using hand gestures, similar to gestures supported by Multi-Touch based systems, letting the user zoom in, zoom out or pan using intuitive hand movements. The drawing application lets the user draw on any surface by tracking the fingertip movements of the user's index finger. SixthSense also recognizes user's freehand gestures (postures). For example, the SixthSense system implements a gestural camera that takes photos of the scene the user is looking at by detecting the 'framing' gesture. The user can stop by any surface or wall and flick through the photos he/she has taken.

INTEL'S GESTURE TECHNOLOGY

What's Next? Gesture Recognition Technology from Intel Labs allows you to interact with and control devices using simple hand gestures. Imagine a world where gestures like turning an "air knob" could turn up the volume on your TV or waving your hand would answer a phone that's in your pocket.

According to a , the target applications for AVX are interface technology to control gaming and entertainment. Intel expects that this forthcoming technology would reduce the need for specialized DSPs and GPUs. Smart computing is here.. Yes visibly smart. But my personal opinion would be that intel would make people more lazy by the launch of the next-generation gesture recognition technology. Its amazing to just thing about the world where we can control TV , PC, Washing machine and other devices at home in just a gesture.

GESTURE TEK

Sensing gesture control interface lets users navigate interactive content on a floating panel, multimedia kiosk, multi touch surface screen, interactive table or interactive window. Surfaces can be configured with a multi-touch interface for multi- touch or multi-point interaction.

With no projector or hardware to be seen, the effect is unforgettable as GestureTek's dynamic interactive displays react to every point of your finger or wave of your hand, delivering a rich, interactive experience.

The hand tracking system lets you control multi-media in ways you never imagined, transforming an ordinary surface into an interactive multi-touch surface computing platform. Illuminate surfaces are available as interactive multi-touch display panels and windows, interactive kiosks and multi-touch tables. Multi-touch interactive surface displays come turnkey or can be customized to virtually any shape or size.

.CONCLUSION

The importance of gesture recognition lies in building efficient human machine interaction . Its applications range from sign language recognition through medical rehabilitation to virtual reality .Gesture recognition 35 soft computing tools pose another promising applications to static hand gesture identification . Thus , gesture recognition promises wide- ranging applications in fields from photojournalism through medical technology to biometrics.

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