

An Approach for Human Gesture Recognition

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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.

INTRODUCTION

In the field of image processing it is very interesting to recognize the human gesture for general life applications. Human gestures can be identified by observing the different movements of eyes, mouth, nose and hands. Many techniques are available to recognize face. Human facial expression recognition by a machine can be described as an interpretation of human facial characteristics via mathematical algorithms. Gestures of the body are read by an input sensing device such as a web-cam. It reads the movements of the human body and communicates with computer that uses these gestures as an input. These gestures are then interpreted using algorithm either based on statistical analysis or artificial intelligence techniques. The primary goal of gesture recognition research is to create a system which can identify specific human gestures and use them to convey information. By observing face, one can decide whether a man is serious, happy, thinking, sad, feeling pain and so on. Recognizing the expression of a man can help in many of the areas like in the field of medical science where a doctor can be alerted when a patient is in severe pain. It helps in taking prompt action at that time.

MOTIVATION

In recent years face recognition has received substantial attention from researchers in biometrics, Pattern recognition, and computer vision communities. The machine learning and computer graphics communities are also increasingly involved in face recognition. This common interest

among researchers working in diverse fields is motivated by our remarkable ability to recognize people and the fact that human activity is a primary concern both in everyday life and in cyberspace. Besides, there are a large number of commercial, securities, and forensic applications requiring the use of face recognition technologies. These applications include automated crowd surveillance, access control, mug shot identification (e.g., for issuing driver licenses), face reconstruction, design of human computer interface (HCI), multimedia communication (e.g., generation of synthetic faces), and content-based image database management.

HUMAN GESTURE

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. 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.

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.
- **Directional indication through pointing.** Pointing has a very specific purpose in our society, to reference an object or location based on its position relative to ourselves. The use of gesture recognition to determine where a person is pointing is useful for identifying the

context of statements or instructions. This application is of particular interest in the field of robotics.

- **Control through facial gestures.** Controlling a computer through facial gestures is a useful application of gesture recognition for users who may not physically be able to use a mouse or keyboard. Eye tracking in particular may be of use for controlling cursor motion or focusing on elements of a display.
- **Alternative computer interfaces.** Foregoing the traditional keyboard and mouse setup to interact with a computer, strong gesture recognition could allow users to accomplish frequent or common tasks using hand or face gestures to a camera.
- **Immersive game technology.** Gestures can be used to control interactions within video games to try and make the game player's experience more interactive or immersive.
- **Virtual controllers.** For systems where the act of finding or acquiring a physical controller could require too much time, gestures can be used as an alternative control mechanism. Controlling secondary devices in a car or controlling a television set are examples of such usage.
- **Affective computing.** In affective computing, gesture recognition is used in the process of identifying emotional expression through computer systems.
- **Remote control.** Through the use of gesture recognition, "remote control with the wave of a hand" of various devices is possible. The signal must not only indicate the desired response, but also which device to be controlled.

REFERENCES

1. Matthias Rehm, Nikolaus Bee, Elisabeth André, Wave Like an Egyptian - Accelerometer Based Gesture Recognition for Culture Specific Interactions, British Computer Society, 2007
2. Henriksen, K. Sporning, J. Hornbaek, K. " Virtual trackballs revisited", IEEE Transactions on Visualization and Computer Graphics, Volume 10, Issue 2, paged 206-216, 2004
3. K. Ouchi, N. Esaka, Y. Tamura, M. Hirahara, M. Doi, Magic Wand: an intuitive gesture remote control for home appliances, International Conference on Active Media Technology, 2005 (AMT 2005), 2005
4. Thomas G. Zimmerman, Jaron Lanier, Chuck Blanchard, Steve Bryson and Young Harvill. <http://portal.acm.org>. "A HAND GESTURE INTERFACE DEVICE