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A PATH FOR HORIZING YOUR INNOVATIVE WORK

METHOD ON GESTURE RECOGNITION OF HANDFOR SIGN LANGUAGE:A REVIEW

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Abstract: In the world of sign language, and gestures. Sign language is the language of communication for deaf and dumb people. For expressing communities thoughts, sign language is used hence communities are dependent on sign language. Sign language occurs unitation of society. And Sign language is increases in research field. Sign language is composed of movement of body in physical manner that is expression on face, hand etc. Gestures are considered as the most natural expressive way for communications between human and computers in virtual system. Hand gesture recognition has greater importance in designing an efficient human computer interaction system. Hand gesture is a method of non-verbal communication for human beings for its expressions much more other than body parts. In this paper a survey on gesture recognition approaches of hand is provided.

Keywords: Sign Language Recognition, Fuzzy Logic, Interaction, Deaf and Dump

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INTRODUCTION

In the present environment of interactive and intelligent computing, an efficient human–computer interaction assumes an most importance. The goal of our work is to make possible the communication between deaf people and the rest of the world in daily life. In this paper we propose a system that is supervised for recognizing

III Gestures Taxonomies:

Several taxonomies have been suggested in the literature that deals with psychological aspects of gestures. They vary Edge-based techniques to extract image parameters from simple silhouettes are used in [38]. The work presented by Kortenkampet al. [39] shows a system able to recognize six distinct gestures using a coarse 3-D model of a human. Nielsenet al. [40] proposed a real time vision system which uses a fast segmentation process to obtain the moving hand from the whole image and a recognition process that identifies the hand posture from the temporal sequence of segmented hands. They have used Hausdorff distance approach for robust shape comparison. Their system recognitions 26 hand postures and achieved a 90%recognition average rate.

IV Hand Gesture Technology:

Gestures are considered as the most natural expressive way for communications between human and computers in virtual system[4] and a powerful means of communication among Humans. The key problem in gesture interaction is how to make hand gestures understood by computers[5].For any system the first step is to collect the data necessary to accomplish a specific task.For hand posture and gesture recognition system different technologies are used for acquiring input data

one component of the sign language communication: finger spelling in English. This is why people with hearing disabilities are unable to communicate with other hearing people without a translator. The use of hand gestures provides an attractive alternative to these

interface devices for human-computer interaction. There are several applications of Sign recognition:

• Enabling very young children to interact with computers; -recognizing sign language.

• The sign language used at a particular place depends on the culture and spoken language at that place.

• distance learning/teaching assistance

The purpose of this paper is present a review of Hand Gesture Recognition techniques for human computer interaction, to create a system which can identify specific human gestures and use them to convey information or for device control. Sign Language Recognition implies conveying meaningful information through the use of hand gestures.

II Technology used:

Rule based Approaches: Rule-based approaches consist of a set of manually encoded rules between feature inputs Given an input gesture a set off eatures are extracted and compared to the rule that matches the input is output ted as the gesture. related to low-level features of the motion of the hands are defined for each of the actions under consideration. When a predicate of a gesture is satisfied over a fixed number of consecutive frames the gesture is returned. A major problem with rule based approaches is that they rely on the ability of human to encode rules.

Machine Learning based Approaches: A popular machine learning approach is to treat a gesture as the out-put of a stochastic process.

Present technologies for recognizing gestures can be divided into vision based, instrumented (data) glove, and colored marker approaches. Fig shows an example of these technologies.

(a) Data-Glove based

data glove approaches use sensor devices for capturing hand position, and motion[4].In this approach, detection of hand is eliminated by the sensors on the hand[3] and it can easily provide exact coordinates of palm and finger's location and orientation, and hand configurations , however these approaches require the user to be connected with the computer physically which obstacle the ease of interaction between users and computers, besides the price of these devices are quite expensive , it is inefficient for working in virtual reality.

(b) Vision based

Vision-based interaction is a challenging interdisciplinary research area, which involves computer Vision and graphics, image processing, machine learning, bio-informatics, and psychology. To make a successful working system, there are some requirements which the system should have:

(a) Robustness: In the real-world, visual information could be very rich, noisy, and incomplete, due to changing illumination, clutter and dynamic backgrounds, occlusion, etc. Vision-based systems should be user independent and robust against all these factors.

(b) Computational Efficiency: Generally, Vision based interaction often requires real-time systems. The vision and learning techniques/algorithms used in Vision-based interaction should be effective as well as cost efficient.

(c) Colored marker

Marked gloves or colored markers are gloves that worn by the human hand with some colors to direct the process of tracking the hand and locating the palm and fingers , which provide the ability to extract geometric features necessary to form hand shape . The color glove shape might consist of small regions with different colors or as applied in where three different colors are used to represent the fingers and palms, where a wool glove was used. The amenity of this technology is its simplicity in use, and cost low price comparing with instrumented data glove. However this technology still limits the naturalness level for human computer interaction to interact with the computer. In vision based methods the system requires only camera(s) to capture the image required for the natural interaction between human and computers and no extra devices are needed. It is more natural and useful for real time applications.

V Related Work:

Recognizing gestures is a complex task which involves many aspects such as motion modeling, motion analysis, pattern recognition and machine learning, even psycholinguistic studies. The enormous potential for sophisticated and natural human computer interaction using gesture has motivated work as long ago as 1980 with systems such as Bolt's seminal "Put-That-There".

Whilst "Put-That-There" used a data glove as input, video has been used in more recent systems. Starner and Pentland's video-based American Sign Language recognition system is a worthwhile and impressive achievement. A vision-based system able to recognize14 gestures in real time to manipulate windows and objects within a graphical interface was developed by Ng et al. in[34]. Abe et al. [35] describe a system that recognizes hand gestures through the detection of the bending of the hand's five fingers, based on image-property analysis. Hasanuzzaman et al. [36] presented a real-time hand gesture recognition system using skin color segmentation and multiple-feature based template-matching techniques. In their method, the three largest skin-like regions are segmented from the input images by skin color segmentation technique from YIQ color space and they are compared for feature based template matching using a combination of two features: correlation coefficient and minimum (Manhattan distance) distance qualifier. In their experiment, they have recognized ten gestures out of which two are dynamic facial gestures. These Gesture commands are being sent to their pet robots AIBO through Software Platform for Agent and

Knowledge Management (SPAK) [37] and their actions are being accomplished according to users predefined action for that gesture.

A. Recognition based on 'UP' and 'DOWN' positions of Fingers:

In the proposed method, a set of 32 signs, each representing the binary 'UP' & 'DOWN' positions of the five fingers is defined. In the proposed method, 32 combinations of binary number sign are developed by using right hand palm image, which are loaded at runtime. An image captured at run time is scanned to identify finger tip positions of the five fingers. Measuring the heights according to a reference point at the bottom of the palm close to the wrist, the tip of fingers is identified. The heights are determined by Euclidean distance measurements.

B. Kohonen self-organizing map algorithm :

In this hand gesture recognition system, we have used an intensity (grayscale) representation of the segmented image for further processing. This grayscale version, also called a "skin map," contains intensity values for skin pixels and the background is represented as black. Then, the Two-Dimensional Discrete Cosine Transform (2D-DCT) for each region is computed, and feature vectors are formed from the DCT coefficients. The DCT can be extended to the transformation of 2D signals or images. This can be achieved in two steps:

i) By computing the 1D-DCT of each of the individual rows of the two dimensional image,

ii) After the above step, by computing the 1D-DCT of each column of the image.

C. Novel segmentation algorithm:

In order to simplify the process of gesture identification, special modified white color woolen hand gloves[6]

E. Eigen value weighted euclidean distance based classification technique:

Eigen values and Eigen vectors are a part of linear transformations. Eigen vectors are the directions along which the linear transformation acts by stretching, compressing or flipping and Eigen values gives the factor by which the compression or stretching occurs. For recognition of hand gestures, only hand portion till wrist is required, thus the unnecessary part is clipped off using this hand cropping technique. After the desired portion of the image is being cropped, feature extraction phase is carried out. Here, Eigen values and Eigen vectors are found out from the cropped image. Here is designed a new classification technique[10] that is Eigen value weighted Euclidean distance between Eigen vectors which involved two levels of classification.

i) Classification based on Euclidean Distance:

Euclidean distance was found out between the Eigen vectors of the test image and the corresponding Eigen vectors of the database image. As five Eigen vectors were considered, we get five Euclidean distances for each database image and then the minimum of each was found out. Mathematically,

where EV1 represents the Eigen vectors of the test image and EV2 represents the Eigen vectors of the database image in Eq. (1).

ii) Classification based on Eigen value weighted Euclidean distance:

The difference of Eigen values of the test image and the Eigen values of the database image was found out. Then, it was multiplied with the Euclidean Distance obtained in the first level of classification given as C2 in equation below. Then sum of results obtained for each image were used. One of the most important features of sign language is that each finger in a gesture conveys a particular message and hence each and every finger has to be individually identified as well. In order to assist this requirement, the woolen hand gloves were modified. This was done by replacing and sewing each finger of the glove with a colored cloth for each digit of the hand. Here, we have utilized a unique .color coding for each finger of our hand in order to assist in identifying the fingers. Therefore, segmentation based on various color spaces would be a viable option. In proposed work, two of the most popular color spaces used other than RGB and their conversion from the RGB color space.

i) YCbCr Color Space

D. Transition movement model :

Transition movement models (TMMs)[7] are proposed to handle transition parts between two adjacent signs in large-vocabulary continuous SLR. For large-vocabulary continuous SLR, TMMs were proposed for continuous Chinese SLR. Sign samples taken from input devices are fed into the feature extraction unit and then input into two related parts i.e. TMM training and recognition based on TMMs. In the TMM training part, sign/sentence samples are trained into sign models and TMMs by the model training module (no TMMs in the first run). Then, these models are used to segment continuous sentence samples into sign parts and transition parts. Transition parts are clustered using the temporal clustering algorithm. We iterate this process until the convergence criterion is met. In the recognition part based on TMMs, the estimated TMMs and sign models obtained from the training part are viewed as candidates of the Viter bi search algorithm, together with language models (Bigram) for recognizing large-vocabulary continuous sign language. added and minimum of them was considered to be the recognized symbol. Mathematically, (2)

where E1 and E2 in Eq. (2) are the Eigen values of the test images and database images respectively.

F. Fingure Detection:

It states an efficient algorithm for identification of the number of fingers opened in a gesture representing an alphabet of the American Sign Language(ASL)and introduces a robust and efficient technique for finger detection[12].The method has three main phases of processing viz., Edge Detection, Clipping and Boundary Tracing. The first phase having Canny edge operator and produces an edge detected image which reduces the number of pixels to be processed at runtime. The second phase clips the undesirable portion of the edge detected image for further processing and the final phase traces the boundary of the image and detects finger tips which aid in finger detection.

CONCLUSION:

In this paper, we give brief summary about various methods and technique which are provided by various authors for recognition of hand gesture. The ultimate goal of hand gesture recognition system is to identify language of physically impaired people as well as to build an efficient human computer interaction system. Computer Vision methods for hand gesture interfaces must surpass current performance in terms of robustness and speed to achieve interactivity and usability. Taking into consideration the research related to vision based hand gesture recognition an observable progress has been made and it can be implemented as a real time application Hand gesture is an active area of research in the computer vision. To continue with the efficiency further research in the areas of feature extraction, classification methods and gesture representation are required to realize the ultimate goal of humans computer interface in the field of sign language recognition for physically impaired peoples.

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