Review Paper on Sign Language Recognition Techniques

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ABSTRACT
In the fast development of knowledge and communication technology, communication sector has improved continuously. Artificial intelligence   could be a field that includes a broad, extremely technical and specialized analysis space that specialize in differing kinds of sub areas and has generated lots of interest with several novel applications within the IT world. Long with recent developments in image process, Artificial intelligence   has conjointly been accustomed mechanically acknowledge sign language gestures, in what's called ASLR (Automatic Sign Language Recognition). The most significance of this paper is to review the key finding of the comparison of similar system and also technology used in vision based hand gesture recognition.

Keywords
Automatic Sign Language Recognition, Feature Extraction, Support Vector Machine, Matlab, Information and Communication Technology.

1. INTRODUCTION
Out of all the categories of disabled individual, deaf people get a high quantity of attention. Since they are doing not have what will be thought-about the foremost essential senses out of the five senses a traditional person has that causes them to possess a larger problem once human action. Even though persons Who become deaf midway in life area unit usually literate and ready to speak are unit deaf from birth or who become deaf in childhood face associate in nursing extreme problem in understanding auditory communication, learning to talk still as corresponding difficulties in accomplishment. Making an attempt lip reading and particularly written materials is also extraordinarily exhausting for them that create linguistic communication. The fore most effective communication methodology for these deaf persons [1]. Attributable to this reason, most of the deaf persons primarily use linguistic communication [2]. The most purpose of this analysis paper is to work out the foremost appropriate strategies to supply an answer for the targeted downside.

2. IMPORTANCE OF SIGN RECOGNITION SYSTEMS
With the rapid development in IT (Information Technology) and HCI (Human Computer Interaction), abundant analysis has been administrated to support the communication between

deaf persons and non-deaf persons. The communication between these teams is tough primarily owing to some main reasons. Deaf persons primarily use signing that is not intelligible by different non-disabled persons. These deaf persons cannot perceive what the non-disabled persons speak. This greatly affects deaf people that do not seem to be sensible in lip reading. Additionally there to most of the deaf person's area unit acquainted and like mistreatment signing compared to written language since the signing structure typically is totally different from the conventional text based mostly communication [3]. To speak effectively with deaf people, data of signing is therefore necessary. But as a result of few non-deaf people perceive signing and additionally owing to the in adequate quantity of signing translators, the deaf community is in an exceedingly helpless scenario most of the time once act with the non-deaf community.

3. SIMILAR SYSTEMS
In the past, several efforts were created to beat these difficulties. Most of them area unit desk top primarily based applications that support the conversion of signing to text and contrariwise. A big resolution was seen within the systems of Thetos [4] and Tessa [5]. The desktop primarily based Thetos system regenerate Polish written texts into the Polish signing, and chiefly used a text modelling technique that centered on reworking continuous input text into a text accommodates sentences in canonical type. Tessa system was associate in nursing experimental system that aimed to help transactions between a handicapped person associate in nursing a clerk during a post workplace by translating the clerk's speech to signing and show mistreatment an avatar. S-Tel [6] was a marking purpose of avatar primarily based signing communication system, and used Cyber gloves. These gloves area unit accustomed sight movements of the hand and fingers mistreatment sensors.

According to Naidoo et al. [7] these systems "are restricted to theemployment of refined and typically costly devices. conjointly applications that use glove primarily based analysis encounter an oversized vary of issues together with reliable ness, accuracy and magnetic force noise ".however as Fudickar and Nurzyńska [3] imply "the less researched however conjointly being terribly promising domain for additional development area unit systems that use video camera for image capture only(without any further markers). The most approaches of those kinds of real time systems were signing communication supported recording, transferring and presenting video streams. However the need of a high speed net facility thanks to the high quantity of information being sent was the most barrier. To beat this drawback Ohene-Djan et al. [8] came up with a brand new resolution, Mak-Messenger that used manual choice method of signs from a button panel. This approach of manually choosing pictures wasn't triple-crown thanks to the shortage of usability. It had been conjointly not protractile, as extending the vocabulary meant manually choosing a symbol from an oversized variety of accessible signs [3]. This highlights the importance of an appropriate resolution which may overcome the mentioned issues.

4. COMPARISON OF SIMILAR SYSTEMS

Anin-depth analysis on selected three systems developed associated with automatic signing recognition was allotted additionally to the final analysis allotted on the previous work. These 3 systems were the Bangladeshi signing recognition system that was developed by Salma Muhammadan [9], S2V System [10] and also the vision based mostly system for Taiwanese sign recognition that was developed by Tsai and Huang [11].

4.1 Number of Training Images Hand Sign Gesture

The quantity of training images used for every Hand Sign Gesture Increasing the coaching image set that uses for every gesture kind is also ready to support in increasing the accuracy level. If a substantial accuracy level is achieved employing a lesser variety of coaching pictures are going to be an additional advantage.

4.2 Feature Extraction Techniques

Reducing the dimensions of pictures so as to cut back the computation time, conversion to an acceptable image format like grayscale, applying edge detection or similar techniques are often applied in extracting the options. A relentless background with a particular color that differs from complexion of the hand are often utilized in order to create the feature extraction more practical. [15].

4.3 Classification Techniques

Out of main compared systems the very best accuracy rate was achieved by the system and it uses SVM for classification.

4.4 Choice of Signing Gesture Varieties

When choosing the gesture varieties a mix of a number of the sign letters within the alphabet and a few of the hand sign numbers so as to confirm the various aspects of hand signs.[16]

5. GESTURE RECOGNITION

A gesture will be outlined as a side of non-verbal communication that uses movement of body to precise feelings rather than or in parallel with verbal communication [12]. These gestures could be body motions of hands, arms, head, face or different components of the body. Gesture recognition is that the method of deciphering human gestures computationally. It is associate in nursing rising analysis space in applied science and specifically in human computer interaction that tries to fulfill HCI principles like naturalness and easy interaction. Gesture recognition techniques will be applied to computationally acknowledge hand gestures. Once it is used for recognizing sign language gestures, it's referred to as Automatic Sign Language Recognition (ASLR). Hand gesture recognition techniques will be divided principally in to 2 classes [13] that are;

• Perception (Glove based) approaches.

• Computer vision primarily based approaches.

Haptic (Glove Based) Approaches: These are embedded with differing types of sensors that are accustomed notice the orientation and position of the hand and fingers so as to spot gestures created by the user. Although these glove based applications have a better accuracy level with a high level of lustiness (comparing to laptop vision based approaches) these have variety of disadvantages that are listed below [7].

5.1 Disadvantages of Glove Based Systems

1. Issues with dependableness since the gloves will slip thanks to sweat or frequent usage.

2. Some gloves are heavier that makes the user uncomfortable in usage over long periods of your time.

3. Since most of the gloves are made solely in a very few totally different sizes, the simplest factor is to use custom created gloves that dead fits the user's hands. This makes a selected glove dead fitting just for one specific person and within the case of youngsters the gloves can got to be modified with the expansion of their hands.

4. Because of frequent usage the gloves will be broken.

5. The incidence of magnetism noise will have an impression on sensors.

6. Limited to use of sophisticated and sometimes expensive devices.

7. It encounter large range of problems including reliability, accuracy and electromagnetic noise.

6. METHODOLOGY FOR HAND GESTURE RECOGNITION

In vision primarily based gesture recognition, as critical victimization gloves, a camera may be accustomed capture pictures of the hands sporadically and therefore the captured pictures may be accustomed acknowledge the gestures created by the hand.[14].

6.1 Image Process

Image process could be an assortment of techniques used for manipulating a digital image to convert into a machine apprehensible approach. The output is also a special sort of a picture or set of knowledge which incorporates the options of the image.

6.2 Edge Detection

Edge detection could be a basic side of image process that is applied on a digital image to spot the sides by detection the brightness variation of the image. The six operators that principally support edge detection in Matlab are Sobel, Prewitt, Roberts, Laplacian of Gaussian, Zero-cross and cagy operators.

6.3 Thresholding

This technique is employed to convert a resourceful image into binary format. Every element worth may be compared with the edge worth and marked as either higher than the edge or below it. Every element that contains the next worth than the edge worth is marked as AN object. For instance
The target object is bright in color than the background, every element within the image is treated as either a part of the article or the background.[16].

6.4 Gray Scale

An original RGB image within which every element is specific victimization 3 (red, in experienced and blue elements of the pixel's colour) values may be reborn into gray scale by substitution the Red, in experienced and Blue values with grey shades. These grey scale pictures contain eight bits of color information in every element which might be varied

at intervals the vary of 256 completely different gray tones from black to white[17].

6.5 Query Sample

The user thought to create hand sign gestures which are able to be the input for the system for sign language recognition. Throughout the coaching section of the appliance the user creates information of his/her hand sign gesture pictures. The coaching section is complete once the system has captured enough gestures that it is aware of the category (meaning), and also the system is then able to acknowledge gestures. The gestures area unit captured by the digital camera with a continuing distance between the hands of the user and also the camera. The illumination ought to additionally ideally be constant. A black color board is unbroken behind the hand to form the background constant, and create the hand space identification method easier. Throughout the coaching section of the appliance the user creates information of his/her hand sign gesture picture
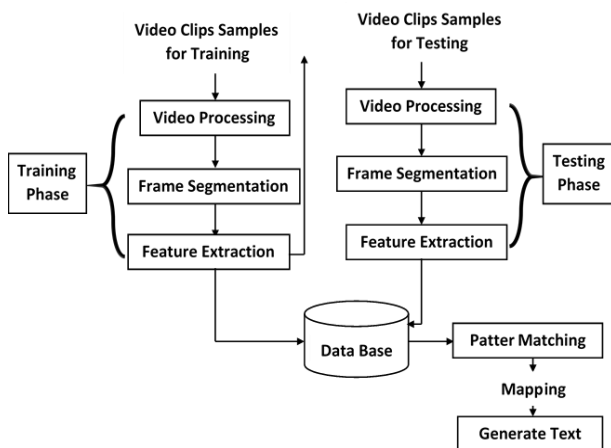
7. PROPOSED SYSTEM DESIGN

Figure 1: Framework of sign language system design.

From the figure 1 we can understand the overall working process of the system. Video of signer is preprocessed using different techniques to avoid any false segmentation in the next stage. Image segmentation stage divides the entire frames of images of the signers into hands and head segments of the signer. Shape features are extracted and are optimized before saving to the database. This process is repeated for all the available signs using a video of a signer. The sign language database can be upgraded to add new signs into the database.

The system can now be tested with the signs present in the database using fuzzy inference system based on rules. The rule based system is a very powerful tool used by many researchers for pattern classification tasks. Once trained the fuzzy inference system produces text response corresponding to the sign irrespective of the signer

8. CONCLUSION

Even though such a large amount of tries were created in developing systems by considering varied aspects of this downside, there's a spot to be stuffed by developing a system that supports remote, two-way communication specially created for deaf and non-deaf people permitting non-deaf people to speak within the method that's most natural and cozy for them. At a similar time, despite the fact that plenty of analysis in developing intelligent systems has been distributed for various forms of sign languages, there are not any existing intelligent systems that support such recognition of Sri Lankan linguistic communication. So this paper focuses on techniques and technologies employed in Automatic linguistic communication recognition which may be applied in implementing an intelligent communication system facilitating the communication between deaf persons and non-deaf person.

This paper effort a lot to develop different systems and compare them To find appropriate automatic sign language recognition mean time effort to build data base with new gestures. Also different techniques and methods used to gesture recognition, and to avoid false image segmentation. More effort taken in elaborating there disadvantages as well. Lastly more focused on image processing techniques with analyzing edge detection and proposed common system.

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