A REVIEW ON CONVERSION OF SIGN LANGUAGE INTO TEXT AND AUDIO

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ABSTRACT

Improvement in Science and Technology aims to better world. The need for a comfortable and simplified life paves way to opportunities that can enhance the existing technology. The empowerment of differently abled will always stand as a priority. Disabled people face non-ending difficulties. Inability to speak is considered to be true disability. People with this disability use different modes to communicate with others, there are n number of methods available for their communication one such common method of communication is sign language. Sign language allows people to communicate with human body language. Sign Language Recognition is one of the most growing fields of research area. Many new techniques have been developed recently.

Sign language is one of the well-structured code language, where each sign has some meaning allocated to it. As we know sign language is the only way for communication for differently abled people. The computer can be modified in such a way that it can decipher sign dialect to content arrange, and can help to remove differences between the typical individuals and the differently abled people. These proposed frameworks which is able to recognize the different letter and sentence sets for Human-Computer interaction giving more exact outcomes about at slightest conceivable time. It'll not only be an advantage for differently abled people but can also be utilized by people belonging to both technical and non-technical background in different applications within the innovation field.

The main purpose of these papers is to convert the signs performed by the dumb people into its corresponding audio and text. In order to do this the user has to perform his/her signs in front of the camera. The system would compare the recorded actions to the contents of its database to play the audio and show the text to understand what the user is actually trying to convey.

Keyword: - *Differently abled***,** *Hand Gesture Recognition,Sign Language, Text to Speech.*

1. INTRODUCTION

Sign Language is the most natural and expressive way for the dumb and deaf people. Normal people, never try to learn the sign language for communicating with the hearing impaired people. This leads to separation of the deaf people. It has been estimated that there are between 0.9 and 14 million hearing impaired in India and perhaps "one of every five people who are deaf in the world, lives in India", making it the country with the largest number of Deaf, and perhaps also the largest number of sign language users. But if the system can be programmed in such a way that it can convert sign language to text and speech format such that, the difference between the deaf people and the normal community can be reduced.

  A sign language is a way of communicating by using the hands and other parts of the body. The main idea is to convert sign language to text/speech. The framework assist speech impaired to communicate with the society using sign language. This leads to the elimination of the mediator who commonly acts as a medium of

translation. This would contain a user friendly environment for the user by providing speech text output for a sign gesture input.

   In this fast moving generation, providing an impartial life for the differently abled still stands as a challenge to the world. The advancement in technology provides us a platform to explore and design a real time sign language recognition system. This system recognizes 26 hand gestures from Indian Sign Language by hand gesture for tech generation. Webcam is used to capture the gestures. Using color model, the signs are processed for feature extraction. The extracted features are compared by using pattern matching algorithm. The features are compared with testing database to calculate the sign recognition. Eventually, recognized hand gesture is converted into text. This system provides an opportunity for deaf and dumb people to easily communicate with normal people without the need of an interpreter.

2. LITERATURE SURVEY

Rajaganapathy, et.al. proposed a conversion of sign language system which consists of a Microsoft Kinect sensor which is a motion sensing device and also contains four microphones used to perform background noise cancelling. The project was based on controlling power point presentation to recognize gestures using the sensor. Once the user gesture and predefined gesture in the system are same then the corresponding word is shown as a text. They have used windows narrator for converting the generated text to speech. The major limitation is that the sensor has an range between 40cm and 4M. The human gestures made beyond this range cannot be recognized by the sensor. [1]

L Latha, et.al. developed a Real Time System for communication of hearing and speech impaired people. This proposed system recognizes the gestures using RASPBERRY Pi kit along with a camera attached to it. This system is done using MATLAB software. In gesture to speech conversion the camera in the system is used to take the input image. Then background elimination and image pre-processing is done to remove noise in the image. In speech to gesture conversion the input voice is taken using the microphone. Finally feature matching is done. After matching, the corresponding image is shown. This system shows the accuracy of 70%. The drawback is, the system speed is a bit slower. [2]

K Avinash, et.al. proposed a method for developing the sign conversion system. The proposed methodology can be explained in two sections namely gestures to speech conversion using flex sensors and Arduino uno microcontroller. Speech to text conversion using voice recognition module, ALCD, microphone and Bluetooth module. The hardware of this module is working due to its ability to receive the data from flex sensors. The proposed method can be upgraded with newer features to carry secret messages using wi-fi modules. [3]

Shweta S Shinde, et.al. proposed a Real Time two way communication system based on image processing. They have used angle and peak calculation to extract the hand gestures and then convert it into speech by using MATLAB inbuilt command. For speech to gesture conversion they have   used Mel-frequency cepstral coefficients. The system provides the result with accuracy of 90% within minimum time. This system helps deaf and dumb people to easily connect with the society. [4]

Kohsheen Tiku, et.al. developed a Real Time system for conversion of sign language to text and speech. In this paper, they have developed an android application to demonstrate the vision-based approach, of sign language to text and speech conversion without using any sensors, and byonly capturing the images of the hand gestures. They have used android studio and OpenCV functions in java to design and implement the application. In this proposed system SVM [Support Vector Machine] model is used to recognize the alphabets from images. In this paper, they have also compared different techniques and have chosen the simple method for creating a vision-based application. [5]

S. G. Mundada, et.al. proposed the method of Real Time conversion of hand gestures into speech implementing vision based technique. This system gives different algorithms and techniques for single hand gesture detection and recognizing through vision based technique. It uses handas basic structure and other properties like centroid for detecting the pattern which are formed by fingers & thumb which also helps in assigning code bits which is converting each gesture into a set of 5 digits representation and motion is detected using movement of centroid in each frame. This system uses techniques like K-means clustering or thresholding for background elimination, peak detection is done by text to speech API and Convex Hull for conversion of words or sentences corresponding to gestures to speech. The limitation of this method is, it detects only the single hand gestures and dataset used is small. [6]

Rasel Ahmed Bhuiyan, et.al. proposed the method for reduction of gesture feature dimension for improvising the hand gesture recognition performance of the numerical sign language. In this proposed paper, hand gestures are extracted from video frame captured through web camera using discrete wavelet transformation and singular value decomposition. A effective fitness function algorithm is used to select hand features by eliminating irrelevant features for improving hand recognition performance. Later, the support vector machine is used to recognize the numerical hand gesture accuracy of American sign language. The proposed model is, then validated using dataset which is constructed on basis hand gesture recognition. The paper focuses on numerical sign language detection which is based on non-touch hand gesture recognition. [7]

Meenakshi Panwar, et.al. developed gesture recognition for human computer interaction. The system implements a simple shape-based approach for recognition of hand gesture using vision-based technique. This model consists of a camera to capture the gesture formed by the user. The hand image is taken as an input for the proposed algorithm. The overall algorithm is divided into four steps, which are segmentation, orientation detection, feature extraction and classification. The used algorithm is independent of user characteristics. This proposed system does not require any additional training of sample data. 390 images has been tested on this implemented algorithm which gives a recognition rate of nearly 92%. As compared to other approaches it requires less computation time. The major drawback of this system is, it does not follow any structured approach to define some of the parameters for the gesture recognition. Based on assumptions made the threshold values are taken into account after testing on some of the images. [8]

Abhijith Bhaskaran, et.al. proposed the method of hand gesture recognition using smart gloves. The proposed idea is the smart gloves technique for recognition of hand gtesture. The proposed idea in this system is a smart glove technique which converts sign language to speech or voice output. The smart glove consists of an Inertial Measurement Unit (IMU) and flex sensors to recognize the gesture. A state estimation method has been developed to track the motion of hands in three-dimensional space. Flex sensor is used to track the fingers orientation. This prototype has been tested for its feasibility in conversion of Indian sign language to speech output. The glove is a multipurpose glove that can be used in various fields like gaming, robotics and medical field even though it is intended for sign language to speech conversion. The drawback of this system is life of sensor like gadgets is limited. [9]

Rosemarry Antony, et.al. proposed translation of sign language to voice for dumb people. The domain they have taken for the implementation of this system is machine learning and implemented using python. In this proposed system, hand gesture is captured from the live video through webcam and feature extraction is done. Then the symbol is predicted. The result what we get will be in the form of voice and it will be audible to everyone. Here the signs will be identified through live video. This proposed system is, very useful for the dumb people for expressing their opinions and for proper communication. This will lead to proper interaction between dumb people and the normal people. [10]

3. CONCLUSION

As per the literature review of all the above papers, they have used different techniques like sensor-based technology, image processing techniques, vision-based technology, discrete wavelet transformation technique, and machine learning using python for conversion of sign language into text and speech. These system consists of web camera which is used to capture the gestures. The signs are processed for feature extraction. The extracted features are compared by using pattern matching algorithm. The features are compared with testing database to calculate the sign recognition. Eventually, recognized hand gesture is converted into text and speech. This system provides an opportunity for deaf and dumb people to easily communicate with normal people without the need of an interpreter.

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