Literature Survey

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Based on Real-Time Communication System Powered by AI for Specially Abled

1. Deaf talk using 3D animated sign language: A sign language interpreter using Microsoft's Kinect v2

(Mateen Ahmed; Mujtaba Idrees; Zain ul Abideen; Rafia Mumtaz; Sana Khalique

This paper describes a neoteric approach to bridge the communication gap between deaf people and normal human beings. In any community there exists such group of disable people who face severe difficulties in communication due to their speech and hearing impediments. Such people use various gestures and symbols to talk and receive their messages and this mode of communication is called sign language. Yet the communication problem doesn't end here, as natural language speakers don't understand sign language resulting in a communication gap. Towards such ends there is a need to develop a system which can act as an interpreter for sign language speakers and a translator for natural language speaker. For this purpose, a software-based solution has been developed in this research by exploiting the latest technologies from Microsoft i.e. Kinect for windows V2. The proposed system is dubbed as Deaf Talk, and it acts as a sign language interpreter and translator to provide a dual mode of communication between sign language speakers and natural language speakers. The dual mode of communication has following independent modules (1) Sign/Gesture to speech conversion (2) Speech to sign language conversion. In sign to speech conversion module, the person with speech inhibition has to place himself within Kinect's field of view (FOV) and then performs the sign language gestures. The system receives the performed gestures through Kinect sensor and then comprehends those gestures by comparing them with the trained gestures already stored in the database. Once the gesture is determined, it is mapped to the keyword corresponding to that gesture. The keywords are then sent to text to speech conversion module, which speaks or plays the sentence for natural language speaker. In contrast to sign to speech conversion, the speech to sign language conversion module translates the spoken language to sign language. In this case, the normal person places himself in the Kinect sensor's FOV and speaks in his native language (English for this case). The system then converts it into text using speech to text API. The keywords are then mapped to their corresponding pre-stored animated gestures and then animations are played on the screen for the spoken sentence. In this way the disable person can visualize the spoken sentence, translated into a 3D animated sign language. The accuracy of Deaf Talk is 87 percent for speech to sign language conversion and 84 percent for sign language to speech conversion.

2. Sign Language Recognition Application Systems for Deaf-Mute People: A Review Based on Input-Process-Output

(Suharjito, RickyAndersonb, FannyWiryana, Meita ChandraAriesta, Gede PutraKusumaa)

Sign Language Recognition is a breakthrough for helping deaf-mute people and has been researched for many years. Unfortunately, every research has its own limitations and are still unable to be used commercially. Some of the researches have known to be successful for recognizing sign language, but require an expensive cost to be commercialized. Nowadays, researchers have gotten more attention for developing Sign Language Recognition that can be used commercially. Researchers do their researches in various ways. It starts from the data acquisition methods. The data acquisition method varies because of the cost needed for a good device, but cheap method is needed for the Sign Language Recognition System to be commercialized. The method

used in developing Sign Language Recognition are also varied between researchers. Each method has its own strength compare to other methods and researchers are still using different methods in developing their own Sign Language Recognition. Each method also has its own limitations compared to other methods. The aim of this paper is to review the sign language recognition approaches and find the best method that has been used by researchers. Hence other researchers can get more information about the methods used and could develop better Sign Language Application Systems in the future.

3. A position and rotation invariant framework for sign language recognition (SLR) using Kinect

(Pradeep Kumar, Rajkumar Saini, Partha Pratim Roy, Debi Prosad Dogra)

Sign language is the only means of communication for speech and hearing-impaired people. Using machine translation, Sign Language Recognition (SLR) systems provide medium of communication between speech and hearing impaired and others who have difficulty in understanding such languages. However, most of the SLR systems require the signer to sign in front of the capturing device/sensor. Such systems fail to recognize some gestures when the relative position of the signer is changed or when the body occlusion occurs due to position variations. In this paper, we present a robust position invariant SLR framework. A depth-sensor device (Kinect) has been used to obtain the signer's skeleton information. The framework is capable of recognizing occluded sign gestures and has been tested on a dataset of 2700 gestures. The recognition process has been performed using Hidden Markov Model (HMM) and the results show the efficiency of the proposed framework with an accuracy of 83.77% on occluded gestures.

4. Smart Communication for Differently Abled People

(R. Bhavani , B. Poornima , M. Surya Bharathi , M. Saraswathi)

This system is useful for dumb, deaf and blind people to communicate with one another and with common people. The dumb people use their sign language which is difficult for common people and blind people to understand. This system converts the sign language into speech which is easy for blind and normal people to understand their language. The sign language is translated into some visual form, to understand for the deaf people also. This text is display on LCD. Sign language is a useful for communication between the deaf community and the normal people. This project is basically designed to minimize the communication gap between the dumb people and the normal one. With this project the dumb people can use the data gloves. Which is used to perform sign language and it will be converted into voice so that normal people can easily understand and also display it on LCD so that people who cannot hear can read it on the screen. Perfection in monitoring and sensing of the dynamic movements involved in “Gesture Based Vocalizer”. Designing of a jacket, which would be capable of recognizing the gestures and movements of animals. Virtual reality application e.g., replacing the conventional input devices like joy sticks in video games with the data glove.

5. Application of Machine Learning Techniques for Improving Learning Disabilities

(Dr. T.S. Poornappriya and Dr. R. Gopinath)

Learning disorders such as dysgraphia, dyslexia, dyspraxia, and others obstruct academic progress while also having long-term implications that extend beyond academic time. It is well acknowledged that this type of disability affects between 5% and 10% of the overall population.

Children must complete a battery of tests in order to be assessed for such disabilities in early life. These assessments are scored by human professionals, who determine if the youngsters require special education strategies depending on their results. The evaluation can be time-consuming, costly, and emotionally draining. Dyslexia is a learning disability marked by a lack of reading and/or writing skills, as well as difficulties with fast word identifying and spelling. Dyslexics have a hard time reading and understanding words and letters. Different methodologies are used in research to distinguish dyslexics from non-dyslexics, such as machine learning, image processing, studying cerebrum behaviour through brain science, and pondering the variations in life systems of mind. E-learning technologies have been increasingly important in higher education in recent years, particularly in improving learning experiences for those with learning disabilities. However, many professionals involved in the creation and deployment of e-learning tools fail to consider the needs of dyslexic pupils. In this research, a comprehensive literature review is conducted on machine learning algorithms for dyslexia prediction and e-learning for learning and cognitive disorders.

6. Glove based gesture recognition sign language translator using capacitive touch sensor

(Kalpattu S. Abhishek,Lee Chun Fai Qubeley,Derek Ho)

These sign language translator is a bridge between those who comprehend sign languages and those who do not which is the majority of humanity. Glove based on charge-transfer touch sensors for the translation of the American Sign Language. These device is portable and can be implemented with low-cost hardware. The prototype recognize gestures for the numbers 0 to 9 and the 26 English alphabets, A to Z. The glove experimentally achieved, based on 1080 trials, an overall detection accuracies of over 92 %, which is comparable with current high-end counterparts. The proposed device I expected to bridge the communication gap between the hearing and speech impaired and members of the general public.

7. Deaf talk using 3D animated sign language (software : Microsoft kinect)

(Mateen Ahmed; Mujtaba Idrees; Zain ul Abideen; Rafia Mumtaz; Sana Khalique)

This paper describes a neoteric approach to bridge the communication gap between deaf people and normal human beings. In any community there exists such group of disable people who face severe difficulties in communication due to their speech and hearing impediments. Such people use various gestures and symbols to talk and receive their messages and this mode of communication is called sign language. Yet the communication problem doesn't end here, as natural language speakers don't understand sign language resulting in a communication gap. Towards such ends there is a need to develop a system which can act as an interpreter for sign language speakers and a translator for natural language speaker. For this purpose, a software based solution has been developed in this research by exploiting the latest technologies from Microsoft i.e. Kinect for windows V2. The proposed system is dubbed as Deaf Talk, and it acts as a sign language interpreter and translator to provide a dual mode of communication between sign language speakers and natural language speakers. The dual mode of communication has following independent modules (1) Sign/Gesture to speech conversion (2) Speech to sign language conversion. In sign to speech conversion module, the person with speech inhibition has to place himself within Kinect's field of view (FOV) and then performs the sign language gestures. The system receives the performed gestures through Kinect sensor and then comprehends those gestures by comparing them with the trained gestures already stored in the database. Once the gesture is determined, it is mapped to the keyword corresponding to that gesture. The keywords are then sent to text to speech conversion module, which speaks or plays the sentence for natural language speaker. In contrast to sign to speech conversion, the speech to sign language conversion

module translates the spoken language to sign language. In this case, the normal person places himself in the Kinect sensor's FOV and speaks in his native language (English for this case). The system then converts it into text using speech to text API. The keywords are then mapped to their corresponding pre-stored animated gestures and then animations are played on the screen for the spoken sentence. In this way the disable person can visualize the spoken sentence, translated into a 3D animated sign language. The accuracy of Deaf Talk is 87 percent for speech to sign language conversion and 84 percent for sign language to speech conversion.

8. AI Improving the Lives of Physically Disabled

(Hemshree Madaan ,Shubham Gupta)

Physical disability is one of the significant concerns that hamper individuals to access the web easily. Most of the physically disabled people cannot use technology because of the limitation of accessibility tools and techniques. It is required that the websites should be made compliant with the requirements of every citizen in a country; that's why they should cater to the needs of the differently-abled citizens as well. Features have to be introduced in the websites so that they are easy to use, readily accessible, understandable, and convenient to everyone including best practices/standards and global innovation techniques. At times, accessibility is confused with providing solutions to disabled people, but the fact is accessibility is not only for differently-abled people, but it's also there for everyone. The matter is every person needs accessibility and uses it when in need.