REAL-TIME COMMUNICATION SYSTEM POWERED BY AI FOR SPECIALLY ABLED

LITERATURE SURVEY

1. Conversation of Sign Language to Speech with Human Gestures

Authors: S. Rajaganapathy, B. Aravind, B. Keerthana, M. Sivagami

Abstract: 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; each word has a set of human actions representing a particular expression. The motive of the paper is to convert the human sign language to Voice with human gesture understanding and motion capture. This is achieved with the help of Microsoft Kinect a motion capture device from Microsoft. There are a few systems available for sign language to speech conversion but none of them provide natural user interface. For consideration if a person who has a disability to speak can stand perform the system and the system converts the human gestures as speech and plays it loud so that the person could actually communicate to a mass crowd gathering. Also the system is planned in bringing high efficiency for the users for improved communication.

2. Hand Gesture Recognition System For Translating Indian Sign Language Into Text And Speech

Authors: Jinsu Kunjumon, Rajesh Kannan Megalingam

Abstract: Communication is merely a means of transferring information from one place, person or group to another. Vocal Communication is the manner in which human being interact with others. Be that because it might, not every one of us isn't able to share our thoughts in verbally due to some physical disabilities. It is very difficult for Deaf and Mute people to convey their thoughts and ideas with normal people. Most of the people does not know sign language which make it difficult for silent people to communicate with others. Some devices are available that convert sign language to text and speech in English, but no

device is available for any other language specifically Malayalam. The proposed system will recognize Indian Sign language and convert it into speech and text in 2 languages English and Malayalam and display it on Android phone.

3. A Face Based Real Time Communication for Physically and Speech Disabled People

Authors: Ong Chin Ann, Marlene lu, Bee Theng Lau

Abstract: The main purpose of this research is to enhance the communication of the disabled community. The authors of this chapter propose an enhanced interpersonal-human interaction for people with special needs, especially those with physical and communication disabilities. The proposed model comprises of automated real time behaviour monitoring, designed and implemented with the ubiquitous and affordable concept in mind to suit the underprivileged. In this chapter, the authors present the prototype which encapsulates an automated facial expression recognition system for monitoring the disabled, equipped with a feature to send Short Messaging System (SMS) for notification purposes. The authors adapted the Viola-Jones face detection algorithm at the face detection stage and implemented template matching technique for the expression classification and recognition stage. They tested their model with a few users and achieved satisfactory results. The enhanced real time behaviour monitoring system is an assistive tool to improve the quality of life for the disabled by assisting them anytime and anywhere when needed. They can do their own tasks more independently without constantly being monitored physically or accompanied by their care takers, teachers, or even parents. The rest of this chapter is organized as follows. The background of the facial expression recognition system is reviewed in Section 2. Section 3 is the description and explanations of the conceptual model of facial expression recognition. Evaluation of the proposed system is in Section 4. Results and findings on the testing are laid out in Section 5, and the final section concludes the chapter.

4. D-Talk: Sign Language Recognition System for People with Disability using Machine Learning and Image Processing

Authors: Bayan Mohammed Saleh, Reem Ibrahim Al-Beshr, Muhammad Usman Tariq

Abstract: Communication plays a significant role in making the world a better place. Communication creates bonding and relations among the people, whether persona, social, or political views. Most people communicate efficiently without any issues, but many cannot due to disability. They cannot hear or speak, which makes Earth a problematic place to live for them. Even simple basic tasks become difficult for them. Disability is an emotive human condition. It limits the individual to a certain level of performance. Being deaf and dumb pushes the subject to oblivion, highly introverted. In a world of inequality, this society needs empowerment. Harnessing technology to improve their welfare is necessary. In a tech era, no one should be limited due to his or her inability. The application of technology should create a platform or a world of equality despite the natural state of humans. On the other hand, technology is the most innovative thing on Earth for every time the clock ticks, researchers, software engineers, programmers, and information technology specialists are always coming up with bright ideas to provide convenience to everyone. This paper shows how artificial intelligence is being used to help people who are unable to do what most people do in their everyday lives. Aligned with communication, D-talk is a system that allows people who are unable to talk and hear be fully understood and for them to learn their language easier and also for the people that would interact and communicate with them. This system provides detailed hand gestures that show the interpretation at the bottom so that everyone can understand them. This research allows the readers to learn the system and what it can do to people who are struggling with what they are not capable of and will provide the technical terms on how the system works.

5. Glove-based hand gesture recognition sign language translator using capacitive touch sensor

Authors: **Kalpattu S. Abhishek, Lee Chun Fai Qubeley, Derek Ho**

Abstract: The sign language translator is a bridge between those who comprehend sign languages and those who do not which is the majority of humanity. However, conventional signa language translators are bulky and expensive, limiting their wide adoption. In this paper, we present a gesture recognition glove based on charge-transfer touch sensors for the translation of the American Sign Language. The 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.

6. Sign Language Recognition Using Template Matching Technique

Authors: Soma Shrenika, Myneni Madhu Bala

Abstract: There is an absence of communication with deaf people in our society. To overcome this barrier the introduction of Sign Language (SL) took place. To convey meaning to normal people, sign language makes use of patterns that are visually transmitted sign patterns. Sign language is also useful for people suffering with Autism Spectrum Disorder (ASD). Normal people cannot understand the signs used by deaf, as they do not know the meaning of a particular sign. The system proposed here aims at solving this problem. This system uses a camera, which captures various gestures of the hand. Then, processing of the image takes place by using various algorithms. First, pre-processing of the image takes place. Then, determination of edges occurs by using an edge detection algorithm. Finally, a template-matching algorithm identifies the sign and display the text. As the output is text, one can easily interpret the meaning of a particular sign. This also curtails the difficulty to communicate with the deaf. The implementation of the system is by using OpenCV-Python. The system uses various libraries.

7. Hand Sign Recognition using CNN

Authors: D. Bhavana, K. Kishore Kumar, Medasani Bipin Chandra, P.V. Sai Krishna Bhargav, D. Joy Sanjana, G. Mohan Gopi

Abstract: Our aim is to produce a model that can recognize hand gestures and signs. We will train a model for the purpose of sign language conversion, a simple gesture recognizing model; this will help people converse with people who are innately deaf and mentally disabled. This project can be implemented in several ways such as KNN, Logistic Regression, Naïve Bayes Classification, Support vector machine and can be implemented with CNN. The method we have chosen is CNN as it gives better accuracy compared to the rest of the methods. A computer program is developed using python language which is used to train the model based

on the CNN algorithm. The program will be able to recognize hand gestures by comparing the input with preexisting dataset formed using the American sign Language. We will be able to convert Sign Language into text as output for users to recognize the signs presented by the sign language speaker. This model is implemented in Jypter Lab, an extension to the platform Anaconda documentation. To further improve, we will also add / integrate the inputs into black and white and take input from camera after using the method of Background subtraction. With the mask set to detect the human skin, this model will not require a plain background to function and can be implemented using a basic camera and a computing device.

8. Real Time Sign Language Recognition System for Hearing and Speech Impaired People

Authors: Tanmay Petkar, Tanay Patil, Ashwini Wadhankar, Vaishnavi Chandore, Vaishnavi Umate, Dhanshri Hingnekar

Abstract: Sign Language is globally used by more than 70 million impaired people to communicate and is characterized by fast, highly articulate motion of hand gesture which is difficult for verbal speakers to understand. This limitation combined with the lack of knowledge about sign language by verbal speakers creates a separation where both parties are unable to effectively communicate, to overcome this limitation we propose a new method for sign language recognition using OpenCV (A python library) which is used for pre-processing images and extracting different skin toned hands from the background. In this method hand gesture are used to make signs which are detected by YOLOv5 algorithm for object detection which is the fastest algorithm till date while Convolutional-Neural-Networks (CNN) are used for training gesture and to classify the images, and further we proposed a system which translates speech into sign language so that the words of the verbal speaker can be transmitted to the deaf/mute. This automated system first detects speech using the JavaScript Web-Speech API and converts it into text because the recognized text is processed using the Natural Language Toolkit and aligns token text with the sign language library (sign language videos) videos according to well-known text and finally shows a compiled output which is displayed through avatar animation for a deaf / dumb person. The proposed system has various advantages like Portability, User-friendly Interface and Voice Module. The software is also very cost-effective which only needs a laptop camera or webcam and hand gesture, system accuracy is compared to high-quality methods and is found to be the best.

9. Sign Language Recognition System using Convolutional Neural Network and Computer Vision

Authors: Mehreen Hurroo, Mohammad Elham Walizad

Abstract: Conversing to a person with hearing disability is always a major challenge. Sign language has indelibly become the ultimate panacea and is a very powerful tool for individuals with hearing and speech disability to communicate their feelings and opinions to the world. It makes the integration process between them and others smooth and less complex. However, the invention of sign language alone, is not enough . There are many strings attached to this boon.The sign gestures often get mixed and confused for someone who has never learnt it or knows it in a different language. However, this communication gap which has existed for years can now be narrowed with the introduction of various techniques to automate the detection of sign gestures . In this paper, we introduce a Sign Language recognition using American Sign Language. In this study, the user must be able to capture images of the hand gesture using web camera and the system shall predict and display the name of the captured image. We use the HSV colour algorithm to detect the hand gesture and set the background to black. The images undergo a series of processing steps which include various Computer vision techniques such as the conversion to grayscale, dilation and mask operation. And the region of interest which, in our case is the hand gesture is segmented. The features extracted are the binary pixels of the images. We make use of Convolutional Neural Network(CNN) for training and to classify the images. We are able to recognise 10 American Sign gesture alphabets with high accuracy. Our model has achieved a remarkable accuracy of above 90%.

10. Sign Language Recognition and Converting into Text

Authors: Shaheen Tabassum, Raghavendra R

Abstract: Sign language is a mode of communication that use a variety of hand movements and actions to convey a message. Deciphering these motions might be a pattern recognition challenge. People use a range of gestures and behaviours to communicate with one another. This study is a system for a human-computer interface that can identify american sign language gestures and produce textual output that reflects the meaning of the gesture. To identify and learn gestures, the proposed system would employ convolutional neural networks and long short term memory networks. This will help to break down the communication gap.