Literature 01: Real Time Sign Language Interpreter

Nath, Geethu G., and C. S. Arun. "Real time sign language interpreter"2017 IEEE

International Conference on Electrical, Instrumentation and Communication Engineering (ICEICE). IEEE, 2017.

The system is implemented in ARM CORTEX A8 processor board using convex hull algorithm and template matching algorithm. Image is obtained using webcam. This hand sign image is converted to text so as to develop a communication between normal and deaf and dumb people. Open CV is the software tool that provides the support with image processing techniques. The recognition of hand sign and conversion to text is accomplished in two stages. The numbers recognised using convex hull detection method and alphabets using template matching method. The system consists of a camera system, beagle bone black board and a display device that can be connected to a network.The image captured by the webcam undergoes various pre processing and processing stages to extract features and finally identification. In order to detect edges canny edge detection algorithm is employed. It is a multistage detection algorithm. The system was developed to recognize sign language used by deafened and speechless people. The system can assist deaf mute people to convey their messages to normal people without the assistance of an interpreter in between. This system can be used for a variety of applications including assistance to deaf mute people. Moreover the device can be used as a sign language learning aid.

Literature no:2 Hand Gesture Based Recognition and Voice Conversion System for Deaf and Dumb

Chauhan, Vaibhav, Shubham Khanna, and Vedika Khanna. "hand gesture Based Recognition and Voice Conversion System for Deaf and Dumb." RAN: 8.

Hand Gesture Based Recognition and Voice Conversion system mainly tracks the hand gestures of the user in order to maintain a communication medium for these specially abled people and with the other normal people. For deaf and dumb people, sign language is the most important mode of communication. To make communication easier this project uses sign language of digits[0 to 9] and combination of digits,alphabets[A to Z] and sentences separated by space.Firstly we need to capture the image the image using the web camera. Then the area of interest is taken out which will be further used for the purpose of gesture recognition in the system then its binary conversion will be done and now it will be given to the trained model and the model will predict the character for the hand gesture.Then it will be converted into the text and then the sound track of the recognized text will be played. This model uses CNN model to extract image and skin colour hand is detacte from the cropped image and rest of the background will be converted to black. Then it converted into binary image and then it is converted into digits or characters based on the sign.

Literature 3: Recognition of Isolated Indian Sign Language Gesture in Real Time

Nandy, Anup, et al. "Recognition of isolated indian sign language gesture in real time." International conference on business administration and information processing". Springer, Berlin, Heidelberg, 2010.

Sign Language enhances the understanding ability for the challenging persons in speech and hearing all over the world. Most of the Indian Sign Language gestures are produced using both hands.Two different approaches utilized for recognition of gestures are Euclidean distance and K-nearest neighbor metrics. This paper demonstrates the statistical techniques for recognition of ISL gestures in real time which comprises of both the handsThe ISL videos were split into image frames.We used constant background while recording the video with different frame rate per seconds (30 fps) and different sizes because we found background removal is computationally complex task and it affects the recognition result in real time [2]. As the feature extraction technique is concerned about the gray scale images so the background was chosen dark. All the image frames were converted into gray scale images. Blurring the gray scale images with Gaussian filter and normalization is applied.

Literature 4: Hand Gesture Recognition for Sign Language Using 3DCNN

Al-Hammadi, Muneer, et al. "Hand gesture recognition for sign language using 3DCNN." *IEEE Access* 8 (2020): 79491-79509.

The hand gesture is a nonverbal form of communication.The importance of automatic hand gesture recognition has increased for the following reasons :1. the growth of the deaf and hard-of-hearing populations, and (2) the extended use of vision-based and touchless applications and devices such as smart TV control, and virtual reality applications.The proposed approach employed transfer learning to beat the scarcity of a large labeled hand gesture dataset. The main mechanisms are as follows:

1.A method to normalize the spatial dimensions of gesture videos based on the facial position, facial length,and human body part ratios. The signer does not need to be in the center of the frame or be a fixed distance from the camera.

2.A 3DCNN model to learn region-based spatiotemporal features for hand gestures. The input of this model is a sequence of RGB frames captured by a basic camera. It does not require other input channels, colored gloves, or a complex setup.

3. Developing different fusion techniques to globalize the local features learned by the 3DCNN model and comparing their performance.

Literature no:5

Design and Development of Android Based Mobile Application for Specially Abled People.

Sukhpreet&kanwalvir singh Dhindsa

Kaur, S., & Dhindsa, K. S. (2020). Design and development of android based mobile application for specially abled people. ***Wireless Personal Communications, 111*****(4), 2353-2367.**

Technology has been advancing day by day and smart phones are providing challenges for the development of latest and sophisticated mobile applications. Talkback feature of Android makes it easy to access touch screen devices, but specially abled people are facing various problems in existing mobile applications. All mobile applications are not following the feature of Talkback and there is a lack of tactile feature. Considering these points, the present study is an attempt to develop a mobile application based on voice and gestures to provide communication services to specially abled people. The mobile application has been developed with the help of android studio and a special mobile case. The mobile case designed to help the beginners of developed mobile application. Color combination technique of green computing has been used to design the layout of mobile application for saving power. Four edge method has also been used in the designing part of mobile application's layout to make it more accessible. The findings of the study revealed that the developed mobile application helps the end user to access features of mobile phone such as call, message, date, time etc. The developed mobile application assists the specially abled people having visual impairment or totally blind. The paper elaborates the design and development phase of mobile application in detail.

Literature 6:

Hand gesture, Text and Speech Translation and Recognition System for specially abled people using AI:

Thoutam, Naresh, et al. "Hand gesture, Text and Speech Translation and Recognition System for specially abled people using AI."

Communication is the main channel between people to communicate with each other.Since deaf and dumb people cannot communicate with normal person so they have to depend on some sort of visual communication. "Special people", that is people who have difficulty in speaking and hearing "The dumb" and "The deaf" people respectively find it difficult to understand what exactly the other person is trying to express and so with the deaf people. Using the speech to text conversion technique, on-screen text provides a better way for the people with Hearing impairment to visually read which is in audio. The vocally impaired people can interact with normal people using our work which recognizes sign languages and converts them into on-screen text as well as audio sounds.

Pre-Processing is basically done to remove the object and background of an image and focus on the hand gestures only. The preprocessed image is then represented in the form of black and white pixels which basically means binary image. In this paper they are using PCA (Principle Component Analysis Algorithm).

This algorithm first Convert all images into the column matrix and then Evaluate the Mean column matrix of column matrix. After that it calculate the difference for each vector set and covariance matrix. Next it calculate Eigen value and mean Eigen value for covariance matrix and sort the Eigen value and finally calculate mapping eigenvectors and for matching, project the data. After feature extraction and recognition, the proposed model convert text to speech by getting the voice from Win 32 SAPI then the model extract voice by comparing the voice already in library and then choose the pace of voice and then initialize the wave player for converting text into speech.

Literature 7:

Deaf and Dumb Gesture Recognition System

Shah, V., Sharma, N., Prince Solanki, P., & Mote, H. (2022). Deaf and Dumb Gesture Recognition System. *International Journal*, (4), 1030-1034.

Rising incidents of visual and hearing imparity is a matter of global concern. India itself has around 12 million visually impaired people and over 21 million people are either blind or dead or both. For the blind people, there are various solutions existing such as eye-donation, and hearing aid for the deaf but not everyone can afford it. The purpose of our project is to provide an effective method of communication between the natural people and the impaired people. So, to address this problem, we are coming forth with a model based on modern and advanced technologies like machine learning, image processing, artificial intelligence to provide a potential solution and bridge the gap of communication. The sign method is the most accepted method as a means of communication to impaired people. The model will give out the output in the form of text and voice in regional as well as English languages so it can have an effect on the vast majority of the population in rural as well as urban India. This project will definitely provide accessibility, convenience, safety to our visually impaired brothers and sisters who are looked upon by the society just because of their disability.

Literature 8:

Innovative study of an AI voice based smart Device to assist deaf people in understanding and responding to their body language.

Battina, Dhaya Sindhu, and S. Lakshmisri. "Innovative study of an AI voice based smart Device to assist deaf people in understanding and responding to their body language."

Human beings can communicate with one another via natural language channels including words and writing, or through body language (gestures) like hand gestures, head gesticulations, facial expressions, lip motion, and so forth. Learning to read and write in normal language is essential but knowing sign language is equally essential. Individuals who are partially deaf rely on sign language as their primary mode of communication. People who have hearing impairments have difficulty communicating with those who do not have hearing issues if they do not have access to a translator. This is why the deaf community will benefit greatly from a technology that understands sign language especially hand gestures. Even though mobile technology is rapidly evolving and becoming incredible, there has been little technological advancement and development for artificial intelligence voice-based smart devices that can assist deaf people in understanding and responding to their body language. When combined with learning algorithms, ubiquitous sensing may be used to integrate all of the body language information. As with spoken language, body language has a variety of libraries and each communication is distinct. With my technology, each user can program their device to detect and comprehend their hand gestures, allowing it to recognize and interpret those signals into a voice. It provides users with full command over their sign language library as well as their spoken communication, making it helpful for anybody who has difficulty hearing or speaking. Studies to investigate ways of bridging this breakdown in communication for the deaf have been in progress, with more to come. There are now available stand-alone tools and apps that may aid in the interaction among people who are profoundly deaf.

Literature 9:

Smart Communication System Using Sign Language Interpretation

Bisht, Divyansh, et al. "Smart Communication System Using Sign Language Interpretation." ***2022 31st Conference of Open Innovations Association (FRUCT)*****. IEEE, 2022.**

Although sign language has become more widely used in recent years, establishing effective communication between mute/deaf people and non- signers without a translator remains a barrier. There have been multiple methods proposed in the literature to overcome these challenges with the help of Sign Language Recognition (SLR) using methods based on arm sensors, data glove and computer vision. However, the sensor-based methods require users to wear additional devices such as arm bands and data-glove. The sensor-free vision-based methods are computationally intensive and sometimes less accurate as compared to the wearable sensor-based methods. In this paper, we propose a vision-based light weight web-based sign-language interpretation system. It provides two-waycommunication for all classes of people (deaf-and-mute, hard of hearing,visually impaired, and non-signers) and can be scaled commercially. The proposed method uses Mediapipe to extract hand features from the input image/video and then uses a light weight random forest classifier to classify the signs based on the extracted features with the accuracy of 94.69 %. The proposed model is trained on alphabets from

American Sign Language. We developed a web-based user interface to remove for ease of deployment. It is equipped with text-to-speech, speech-to-text and auto- correct features to support communication between deaf-and-mute, hard of hearing, visually impaired and non-signers.

Literature 10:

SIGN LANGUAGE RECOGNITION FOR DEAF AND DUMB PEOPLE USING ANDROID ENVIRONMENT;

Gayathri, A., and A. Sasi Kumar. "Sign language recognition for deaf and dumb people using android environment." ***International Journal of Current Engineering and Scientific Research (IJCESR)*** **4 (2017).**

This paper helps the deaf and dumb person to communicate with the rest of the world using sign language. Voice-based email and chatting systems are available to communicate with each other by blinds. Without dialing number we can communicate to other like face to face communication. • It does not require large amount of storage as it uses the Hand speak support through online. • The sign words are signed in the same order as letters appear in English alphabets. Voice SMS is an application developed in this work that allows a user to record and convert spoken messages into SMS text message. User can send messages to the entered phone number. Speech recognition for Voice uses a technique based on hidden Markov models (HMM - Hidden Markov Model). Android app called “MIMIX” which converts Anything a person will say is immediately translated to sign language through Mimix. In this Mimix application the limitation is to convert the normal language into sign we first record the sentence the by clicking convertor button it convert to sign language. This project also supports Automatic translation, automotive speech recognition, and Speech-to-sign transmission.