Literature Survey

REAL-TIME COMMUNICATION SYSTEM POWERED BY AI FOR SPECIALLY ABLED

1.Design of a Communication System using Sign Language aid for Differently Abled People

Published in: Mar-2017

Authors: Shrikant Temburwal, Payal Jaiswal, Shital Mande, Souparnika Patil

One of the most precious gifts of nature to the human race is the ability to express itself by responding to the events that occur in its environment. Every normal person sees, hears, and then reacts to the situations by expressing himself. But there are some less lucky ones who are deprived of this precious gift. Such people, especially deaf and mute, rely on some sort of gesture language to communicate their feelings to others. The deaf, dumb and the blind follow similar problems when it comes to the use of computers. In the era of advanced technologies, where computers, laptops and other processor-based devices are an integral part of everyday life, efforts must be made to make the disabilities in life more Our goal is to design a human computer interface system that can accurately identify the language of the deaf and dumb. With the use of image processing and artificial intelligence, many techniques and algorithms have been developed in this area. Each character speech recognition system is trained to recognize the characters and convert them into the required pattern. The proposed system aims to give speech speechless, a real-time character language is captured as a series of images, and it is processed and then converted into speech and text.

Sign Language, Communication aid, Sign Recognition, Image Processing, Text Language.

TECHNOLOGIES TO BE USED:

Blob Detection:

This algorithm helps to draw rectangles around the defective part. The methods aim to detect areas in a digital image that differ in properties, such as brightness or color, compared to surrounding regions. Independent detection of corresponding regions in scaled versions of the same image. A blob is a region of an image in which some properties are constant

or approximately constant, all points in a blob can be viewed in a certain sense to be similar to one another.

Skin color recognition:

Skin detection is the process of finding skin colored pixels and regions in an image or video. This process This process is typically used as a preprocessing step to find areas that may have human faces and limbs in images.

Template Matching:

Template matching is a technique in digital image processing to find small portions of an image that match a template image. It can be used in manufacturing as part of quality control, one way to navigate a mobile robot, or as a way to detect edges in images.

The proposed communication system between Deaf and Dumb people and ordinary people are aiming for it when bridging the communication gap between two societies. Several work is done earlier in this area, but this paper adds in complete two - sided communication in an efficient manner because the system is implemented as one Handy mobile application. So, it really serves its needs in all aspects. The above strategies prove to be efficient In terms of time and accuracy. Further improvements can be done in the implementation of the communicator with other sign language such as American Sign Language, Accent recognition for different accents throughout Globe, recognition of emotions in sign language and language Translation.

2.Sign Language Recognition with Transformer Networks

Published in: May – 2020

Authors: Mathieu De Coster , Mieke Van Herreweghe , Joni Dambre

Sign languages are complex languages. Research into them is ongoing, supported by large video corpora of which only small parts are annotated. Sign language recognition can be used to speed up the annotation process of these corpora, in order to aid research into sign languages and sign language recognition. Previous research has approached sign language recognition in various ways, using feature extraction techniques or end-to-end deep learning. In this work, we apply a combination of feature extraction using Open Pose for human key point estimation and

end-to-end feature learning with Convolutional Neural Networks. The proven multi-head attention mechanism used in transformers is applied to recognize isolated signs in the Flemish Sign Language corpus. Our proposed method signifificantly outperforms the previous state of the art of sign language recognition on the Flemish Sign Language corpus: we obtain an accuracy of 74.7% on a vocabulary of 100 classes. Our results will be implemented as a suggestion system for sign language corpus annotation.

sign language recognition, deep learning, corpus annotation.

This work presents four network architectures for SLR: three based on transformer networks and one based on LSTMs. Pigou et al. (2016) used end-to-end deep learning to extract features from video data and classify signs based on these features. Initial results in this work indicate that a network trained using features extracted by the pose estimation technique OpenPose is able to signifificantly outperform this previous work. However, by using state of the art techniques for computer vision (pre_trained CNNs) and sequence learning (transformers), end_to-end deep learning is able to extract features that are more salient than OpenPose keypoints. Future work on SLR in sign language corpora must focus on extracting salient features from the available data. By using attention to combine both feature sets (learned features and OpenPose keypoints), the network accuracy can further be improved beyond what is possible when considering either feature set in isolation. Our best method, which we name the “Multimodal Transformer Network”, obtains 74.7% accuracy on the unseen test set for a vocabulary of 100 classes.

Finally, we show that increasing the dataset size leads to increased performance. The proposed methods can be used in a suggestion tool for sign language corpus annotation. Such a tool has the potential to speed up the annotation process, which will lead to the availability of larger datasets for SLR.
In future work, we will investigate continuous SLR and focus on creating models that are capable of understanding sign language.

3.A survey paper on Speech/Audio to Sign Language

Translator for Deaf People

Published in: December- 2021
Authors : Onkar Bidkar, Ashlesha Deshpande, Apurva Potdar Jain, Prerana Thokal

Communication is the necessary piece of life. Around 360 million individuals on the planet are experiencing hearing disability and 32 million of these are youngsters, and their life isn't how ever simple as it could be for human without boundary. Hard of hearing and almost deaf individuals discover hard to utilize cell phones since they can't get to data anyplace because of absence of administrations. They experience issues with perusing and composing, to peruse and see all data to utilize cell phones because of their hearing impairment which is an invisible handicap. The increase of involvement gathered by hard of hearing kids in four years is comparable to the addition of one year for hearing youngsters. All visual text based data isn't open for this class of individuals with inabilities. To give advantages to hard of hearing individuals to improve their social integration and communication. This project presents the Sign Language Recognition system capable of recognizing hand gestures by using python.

Sign Language, Speech language, Text image processing

- To make communication easy for the deaf community.
- To provide accurate results with proper statistics.
- To covert speech to Indian sign language in real time.

This sign language translator is able to translate alphabets and words at a high accuracy. All the signs can be translated according to input speech. The accuracy of recognition can be increased by increasing the database size. We aim to bridge the communication gap between the hearing and unimpaired hearing people.

4.Real Time Speaking System for Speech and Hearing impaired People - Literature Survey

Published in : Apr- 2021

Authors: Uma N M, Syeda Rabiya Hussainy, Syeda Hafsa Ameen,Subahini.A, Prof.Sundari ,Tribhuvanam

Sign language plays a vital role in communication between audio-vocal challenged and normal people. In this paper, we propose a new approach that recognizes the hand gesture based on Indian Sign Language and convert them into text and speech output. This system uses the vision-based technique where the hand gestures and facial expressions are captured using web-camera and the various technologies. The captured images are processed with image processing, and classified with neural network, Open CV to recognize the hand gesture and facial expressions and convert it into text and speech using microcontroller based hardware (raspberry pi).

Indian sign language, hand gesture, facial expressions, image processing, raspberry.

The main purpose of our project is to minimize the communication gap between the normal world and the deafmute people, to make their everyday life a little simple. We have implemented a system that is capable of recognising human hand gesture and simultaneously produce corresponding speech and text output. This system recognises the facial expressions and hand gestures without any glove based data acquisition devices. The recognition is done in real time for obtaining text and speech output. Therefore, our system aids the SpeechHearing impaired community by reducing the communication gap.

5.Real-Time Sign Language Converter for Mute and Deaf People

Published in: 2021 International Conference on Artificial Intelligence and Machine Vision

Authors: Akshit J Dhruv , Santosh Kumar Bharati

Deaf people may get irritated due to the problem of not being able to share their views with common people, which may affect their day-to-day life. This is the main reason to develop such system that can help these people and they can also put their thoughts forward similar to other

people who don’t have such problem. The advancement in the Artificial intelligence provides the door for developing the system that overcome this difficulty. So this project aims on developing a system which will be able to convert the speech to text for the deaf person, and also sometimes the person might not be able to understand just by text, so the speech will also get converted to the universal sign language. Similarly, for the mute people the sign language which they are using will get converted to speech. We will take help of various MLand AI concepts along with NLP to develop the accurate model. Convolutional neural networks (CNN) will be used for prediction as it is efficient in predicting image input, also as lip movements are fast and continuous so it is hard to capture so along with CNN, the use of attention-based long short-term memory (LSTM) will prove to be efficient. Data Augmentation methods will be used for getting the better results. TensorFlow and Keras are the python libraries that will be used to convert the speech to text. Currently there are many software available but all requires the network connectivity for it to work, while this device will work without the requirement of internet.Using the proposed model we got the accuracy of 100% in predicting sign language and 96% accuracy in sentence level understanding.

Machine vision, Memory management, Gesture recognition, Assistive technologies, Predictive models, Real-time-system, Software.

6.Gesture Recognition using Leap Motion for Deaf and Dumb

Published in: April 2018

Authors : Moolya Srinidhi Raghu, Meghana K Rao, Chaithanya Suresh Amin, Ashuntha Arline Dsouza , Rashmi K R

Sign language is the way through which deaf and dumb people can communicate with each other. It has been observed that impaired people find it very difficult to interact with the society. Normal person cannot able to understand their sign language. This system uses Leap Motion Controller to capture the signs. Thus, the method is proposed for feature extraction of dynamic gesture of Indian sign language. This proposed method extract feature from the sign and convert to the intended textual form and audio form. This integrated feature improves the performance of the system, the system serves as an aid to disable people. The purpose is to design a Sign Language switch into speech Translation system for gesture based on a 3-dimensional (3D) motion detector referred to as Leap Motion device. The leap motion device consists of three infrared sensors and two inbuilt cameras which is capture 3D images or hand gestures.

Gesture Recognition, Leap Motion, Sign Language.

The proposed system was implemented using leap motion and the code is written using python programming language. Data is collected from gesture using leap motion sensor. A data base of all hand signals is created using tensor flow in Python Language.

All the gestures are trained into the Neural network and text is assigned to each gesture using recurrent neural network. The Neural network is the input for Microprocessor and the input is given using leap motion controller. The neural network code running in the microprocessor detects the hand signals. The convolutional neural network converts images to vector. The vector is fed to recurrent neural networks which gives output in the form of text. Then using a third-party software, the text is converted into speech.

Sign language recognition is essential for the deaf and dumb people to communicate with other people. Leap motion controller is used to recognize the Indian sign language. Leap motion controller is 3D non-contact motion sensor which detects and tracks hands, finger, bones and finger like objects reporting discrete position and motion. It has some advantages like robustness, requires less memory, fast processing. It does not require any specific background and environmental condition.

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

Published in : July-August 2020

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

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.

Machine learning, disability application, sign language, image processing, neural networks, artificial intelligence.

The main objective of this research has been achieved successfully. Gesture interpretation works best in case users who understand sign language may interact with people who are unfamiliar with sign language. Speech interpretation is helpful for sign language non-speakers who want the accompanying hand sign to be understood. Room conditions such as lighting can play a role in predicting the outcome of poor lighting. The light that is either too bright or too dim will result in inaccurate hand segmentation, resulting in inaccurate gesture prediction. The type of inaccuracy can emerge from the user's peripherals, such as poor web camera performance or poor microphone quality. In a nutshell, the development of

technology is essential, and its deployment in sign language is highly critical.

8.Research on Communication APP for Deaf and Mute People Based on Face Emotion Recognition Technology

Published in : 14-16 October 2020

Authors: Yuan Tao, Shihang Huo, Wenyu Zhou

Deaf people cause inconvenience to their daily communication due to different degrees of hearing loss, and their hearing loss may also affect their ability to recognize facial emotions, thereby further affecting their interpersonal communication. Therefore, the use of emerging information technology to solve the hearing impairments of deaf and dumb people, language barriers of deaf and dumb people, regional language barriers, and emotional barriers of deaf and dumb people contributes to the smooth communication between deaf and dumb people and hearing people.

And improving the education system for all has important practical significance. Based on this research background, the paper uses eye movement and event-related potential analysis methods to try to study the characteristics of deaf people's potential cognitive abilities in face emotion recognition and sign language recognition tasks from different experimental paradigms, extract the target area by means of image processing, and Use appropriate feature description, sign language video recognition technology, emotional speech synthesis technology, speech recognition technology and machine learning methods to make further accurate judgments, and finally perform sign language and emotion recognition. Finally, the APP software was tested for running. Through experiments on 630 gesture images, the recognition rate reached 94.22% and the speed reached 0. 29s/frame. The

results show that the proposed algorithm effectively improves the recognition rate and can meet the realtime performance of dumb language communication.

Deaf people’s hearing loss of different degrees brings inconvenience to their daily communication and communication. At the same time, hearing loss may also affect their ability to recognize facial emotions, thereby further affecting their interpersonal communication. Previous studies have shown that the deaf people’s facial emotion recognition ability has a certain degree of defects, especially the negative emotion recognition ability. However, previous studies mostly used behavioral performance as an observation indicator, and little is known about the potential cognitive characteristics of deaf face emotion recognition.