
REAL TIME SIGN LANGUAGE RECOGNITION USING COMPUTER VISION

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ABSTRACT

A disability that hinders a person's capacity for verbal communication is linguistic impediment. Among the most structured languages is sign language, which would be designed to address this issue. There seems to be undeniably a requirement for a system or software program which can detect sign language gestures, allowing for communication even with individuals who do not understand sign language. A real-time system was developed with the aid of machine learning and image processing. Pre-processing images and eradicating multiple hands from the background are both done via image processing. These images, which were taken after the background was removed, were used to create data that contained the 26 English alphabets. Indeed a customized dataset and spontaneous hand gestures performed by individuals of varied complexion have been employed to evaluate the convolutional neural network that has been proposed here.

Keywords: Linguistic Impediment, Image Processing, Convolutional Neural Network, Verbal Communication.

I. INTRODUCTION

Among a person's most valuable assets would be the ability to perceive, listen, respond, but also behave in various circumstances. However, several unfortunate individuals are denied this. It's challenging to create a single, compact gadget for those who are visually, aurally, or vocally impaired. The problem of communicating with a deaf-dumb individual has always been difficult. This idea proposes a cutting-edge foundation for a combined deaf, dumb, and blind communication system. We provide a technique for a blind person to comprehend a text, and it requires capturing a picture with a camera that converts the text into speech (TTS). Through using speech-to-text (STT) conversion technology, it provides a way for the hearing impaired to read a text.

II. RELATED WORK

[1] The primary form of communication for the deaf and hard of hearing with their family members and the rest of society is sign language, which is essential in transferring meaning through a visual-manual modality. The study of sign languages has shown a new promise with the developments in computer graphics, computer vision, neural networks, and the advent of new powerful hardware. People can learn, communicate, interpret, translate, depict, record, and develop numerous sign languages and their related skills with the aid of novel technologies. New apps and solutions that enhance the various performance indicators in these sign language-related tasks are being driven by deep learning and image processing.

[2] It is extremely challenging for intelligent systems to do continuous sign language recognition (CSLR), which needs running computationally intensive video analytics and language modelling. In this paper, we offer a deep learning system dubbed SignBERT that can extract spatial characteristics for CSLR and model the underlying sign languages. SignBERT combines the residual neural network and the bidirectional encoder representations from transformers (BERT) (ResNet). We also offer a multimodal version of SignBERT that incorporates the input of hand images with an intelligent feature alignment in order to close the gap between the probability distributions of the recognition outcomes provided by the BERT model and the hand photos. Using three challenging continuous sign language datasets, experimental results demonstrate that our technique outperforms alternative CSLR.

[3] One of the non-verbal communication techniques utilized in sign language is the hand gesture. It is mostly used by deaf and dumb individuals to communicate with other people or among themselves when they have hearing or speech issues. Many makers around the world have created numerous sign language systems, however they are neither adaptable nor economical for end users. Therefore, it is software that shows a system

prototype capable of automatically recognizing sign language to assist deaf and dumb individuals in communicating with each other or regular people more successfully. Normal people often find it difficult to understand and communicate with dumb individuals, hence they are typically denied regular social interaction. These folks are forced to use visual communication or an interpreter. It won't always be possible to use an interpreter, and visual communication is typically challenging to understand. In the community of the deaf and dumb, sign language is the main form of communication. It is mostly used by their families and/or the deaf and dumb population because the average individual is unable to understand the syntax or meaning of the numerous gestures that make up sign language.

[4] Speech impairment is a disability that affects an individual's ability to verbal communication. To overcome this issue sign language is used which is one of the most organized languages. This paper is an effort towards filling the gap between differently-abled people like deaf and dumb and the other people. Image processing combined with machine learning helped in forming a real-time system. Image processing is used for pre-processing the images and extracting different hand from the background. These images obtained after extracting background were used for forming data that contained 24 alphabets of the English language. The accuracy obtained by the proposed algorithm is 83%. In this paper, machine learning is used along with image processing. Images of the hand are captured and preprocessed for extracting the hand from the background. Computer vision is providing vision to machines so that they can extract important features from the images captured.

[5] 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. 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. 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.

III. PROPOSED METHOD

The process is performed by assigning a minimum threshold voltage to recognize the voice signal. The input is given through a microphone which is converted into a text format.

The device will have the ability to capture hand gestures when input data is uploaded to the computer via a webcam.

It is an optical character recognition engine for various operating systems. Tesseract can detect whether text is mono spaced or proportionally spaced.

The process starts with the capturing of image. Convert the RGB image into gray scale image for better functioning. The text is printed on display and read out by the Speaker. The Dumb people convert their thoughts to text which could be transferred to a voice signal. The converted voice signal is spoken out by espeak synthesizer. After entering the text from keyboard, the espeak synthesizer converts text to speech.

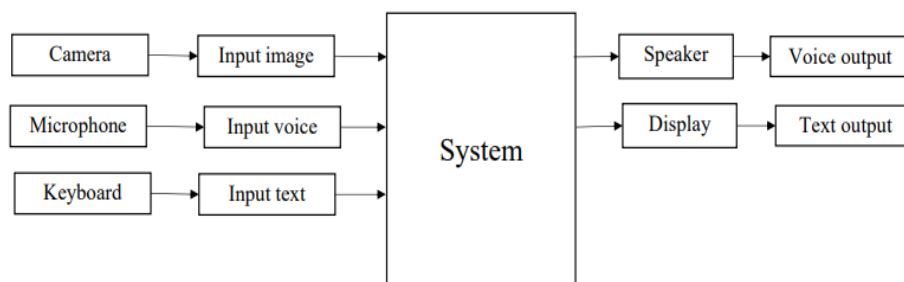


Fig 01: Block Diagram of the application

IV. HARDWARE SPECIFICATION

The proposed framework ran on the server with the following hardware and software specifications:

Raspbian OS / Noobs OS, Tesseract OCR,

V. RESULT

This project aims to lower the communication gap between the deaf, dumb and blind community and the normal world by designing the prototype model for them into a single compact device. The device can be used as smart assistant for differently abled people to communicate with others and it is a language independent system. Basically it acts as an artificial ear, tongue and eyes to a differently abled people.

VI. CONCLUSION

This project will make it easier for the deaf or mute community to interact with the rest of society and lead normal lives. We have combined the prototype model for the blind, deaf, and stupid into a single small device. The technology is able to serve as a smart assistant for people with disabilities and is language independent. In essence, it functions for those with abnormalities as a fake tongue, ear, and eye.

VII. REFERENCES

- [1] Boban Jokimoski, Eftim Zdravevski: Technological solutions for sign language Recognition: A scoping review of research trends, challenges, and opportunities, IEEE, Vol 10, April-2022
- [2] Zhenxing Zhou, Vincent W L Tam, Edmund Y Lam: A BERT based deep learning framework for continuous sign language Recognition ,IEEE, Vol 9, December-2021
- [3] R Rumana, Reddygari Sandhya Rani, Mrs. R. Prema :A Review on sign language Recognition for the deaf and dumb, IJERT Vol.10 Issue 10, Oct-2021
- [4] Jinalee Jayeshkumar Raval, Ruchi Gajjar: Real-time sign language recognition using computer vision, ICPCSC May-2021, Coimbatore
- [5] Soma Shrenika, Myneni Madhu Bala: Sign language Recognition using template matching technique, University College London, July-2020.