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IJMASRI, Vol. 1, issue 1, pp. 44-47, Apr. -2025

<https://doi.org/10.53633/ijmasri>

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY ADVANCED SCIENTIFIC RESEARCH AND INNOVATION (IJMASRI)

ISSN: 2582-9130

IBI IMPACTFACTOR 1.5

DOI: 10.53633/IJMASRI

RESEARCH ARTICLE

INSTANTANEOUS INTERPRETATION OF SPEECH IN TO SIGN- LANGUAGE USING SPEECH RECOGNITION AND NLP

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Abstract

Communication is the contacting bridge between from one person to another person and it is the process of exchanging thoughts and messages through speech, signs and visuals. But in the world of 700 million populations, 70 million people are deafened dumb as per WHO reports. They are communicating through the sign languages, but everyone can't able to speak the sign-language because of the difficulty of the language. So, this model takes speech as an input from the people through microphone by using speech-recognition model and the speech is converted into text and the text is preprocessed by natural language processing and the text is converted into sign language as an output. To bridge this gap, our innovative model leverages speech recognition technology to convert spoken language into text. This text is then preprocessed using Natural Language Processing (NLP) techniques and translated into sign language, providing a seamless and intuitive output. By facilitating communication between the deaf and dumb community and the rest of the world, our model aims to break down barriers and foster greater inclusivity and understanding.

Keywords: NLP, ASL.

Introduction

The biggest advantage would be that our sign languages are shown in animation form. And it's very easy to understand and use, the user must have a

microphone in hand and our system would help them communicate with the impaired person.[1]

In this it takes audio as input, display the text on screen and finally it gives sign code / language of given input. All the words in the sentence are then

checked against the words in the data set containing videos and GIFs representing the words. If the words are not found, it splits the words into an individual letter and show the corresponding videos/clips which are predefined in the system.[2]

EXISTINGSYSTEM

Although sign language is used across the world to bridge the gap of communication for hearing or speech impaired which depend mostly on sign language for day-to-day communication, there are not efficient models that convert text to Indian sign language. There is a lack of proper and effective audio-visual support for oral communication. [3]

While significant progress has already been made in computer recognition of sign languages of other countries but a very limited work has been done in ISL computerization. Work done so far in this field has been much more focused on American sign language (ASL) or British sign language, but for Indian sign language, systems that have been developed are very few. There are already many such applications available that convert speech to text and then there are applications that convert text to sign language, we decided to incorporate these together and give you a speech-to-text-to- sign language translator.

In the existing system, the output will be like gifs or videos. The disadvantages of the already present systems were, that they either followed the ASL (American Sign Language) or could only take input in a particular and specific languages. I have tried my best to overcome these limitations in our model. [1]

PROPOSEDSYSTEM

The proposed system of our model is that it takes the speech as an input and our model can recognize that speech, further this speech is translated to text and the Sign Languages are available. The biggest advantage would be, that our sign languages are shown in animation form. And it's very easy to understand and use, the user must have a microphone in hand and our system would help them communicate with the impaired person.

[1]The main advantage of our model is that we can give input as speech as well as text, and the model can give corresponding sign language for the input. The proposed system will have the advantage

of converting speech to text for user acknowledgment to know what they have spoken.

In this it takes audio as input, display the text on screen and finally it gives sign code / language of given input. All the word sign the sentence are then checked against the words in the dataset containing videos and GIFs representing the words. If the words are not found, it splits the words into an individual letter and shows the corresponding videos/clips which are pre defined in the system. [2]

- **More accurate results:** As it uses speech features instead of metadata the sign language comparison is more accurate and thus, we can achieve higher precision of results. [2]
- **Easy user interface:** The system is implemented as a simple and easy-to- use user inters face kept in mind. Any normal user easily retrieves their features without any hindrance. [3]
- **Easier for normal people:** Normal people can easily interact with deaf people with this system.
- **No need to learn sign language:** By using this model, the difficult in learning sign language are eradicated.

IMAGEPROCESSING TECHNIQUES

1. Hand Tracking:

Detecting and tracking the hand movements using techniques like background subtraction, thresholding, or deep learning- based methods. [1]

2. Finger Detection:

Identifying individual fingers and their positions using techniques like edge detection, contour detection, or convolutional neural networks (CNNs). [1]

3. Pose Estimation:

Estimating the 3D pose of the hand and fingers using techniques like marker-based tracking or markerless tracking using deep learning.[1]

4. Gesture Recognition:

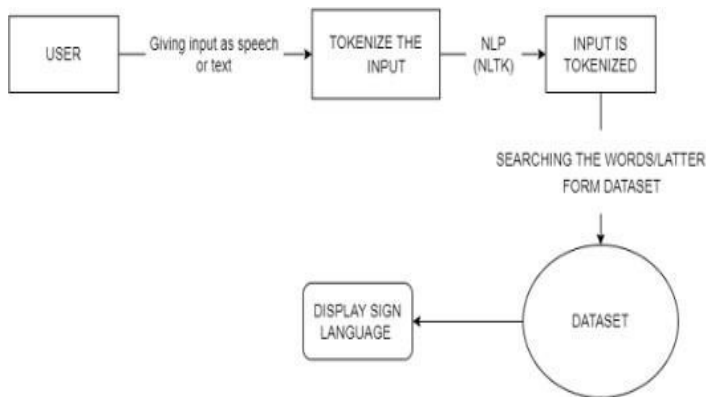


Fig 1: Image Processing

Recognizing specific hand gestures or sign language symbols using techniques like template matching, feature extraction, or machine learning algorithms. [2]

5. Avatar Animation:

Animating a 3D avatar to mimic the sign language gestures using techniques like keyframe animation, physics-based animation, or machine learning-based animation. [3]

CONCLUSION:

A significant section of Indian society suffers from hearing and speech impairment. This population uses Indian Sign Language as their primary mode of communication. Due to the difficulty in learning and understanding the meaning and context of written texts, sign language is preferred. Sign language involves the usage of hands, lip movements, and expressions to communicate words, emotions, and sounds. The proposed system provides an efficient method to aid communication between an individual with hearing and speech impairment. It is a field that had a little development to over the years, particularly in successful implementation in Python programming language.

The system would improve access to information for the hearing-impaired population of a country like India. Moreover, the system can also act

as an educational tool to learn ISL. Here, we have attempted to create a model that will allow people with disabilities to express themselves distinctly, which will help them blend with the rest of the world without any difficulty. Our proposed model will successfully convert the given input audio into an animation. Many improvements along this route can be made as and when the ISL Dictionary grows.

The words in the ISL are small, so many improvements can be made by adding new words to their dictionary to increase their breadth. In addition, text-and-speech integration can be done on a project to enable Monaural/Speech to Indian Sign Language Translators to better communication techniques that will allow users to convert Text into Indian Sign Language by hand- input text.

FUTURE ENHANCEMENT:

In the future, the proposed approach will be tested against unseen sentences. Furthermore, the machine translation approach will be studied and implemented on parallel corpora of English and ISL sentences. The ISL corpus will be used for testing ISL sentences and the performance will be evaluated with evaluation parameters.

This could enable sign language users to access personal assistants, use text-based systems, search sign language video content, and use automated real-time translation when human interpreters are not available. With the help of AI, automated sign language translation systems could help break down communication barriers for deaf individuals.

Various front-end options are available such as .net or Android app, that can be used to make the system cross-platform and increase the availability of the system.

The system can be extended to incorporate the knowledge of facial expressions and body language too so that there is a complete understanding of the context and tone of the input speech.

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