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# Smart Translation for Physically Challenged People Using Machine Learning

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**ABSTRACT:** Our project's goal is to create a deaf person's communication system. Two phases make up this project. (1) It converts the audio message into sign language, and (2) it converts images into text/speech. In the first category we are going to consider takes audio as input, convert this audio recording message into text and display the relevant Indian Sign Language images or GIFs which are predefined. By using this system, communication between normal and deaf people gets easier. In the second category we are going to collect the images and train images using CNN and display the result.

**KEYWORDS:** Sign Language, Image Processing, Deaf and Hard of Hearing, Natural Language Processing.

## I. INTRODUCTION

In a world that heavily relies on verbal communication, individuals with hearing difficulties face challenges in expressing themselves and accessing information. The aim of our project is to design a revolutionary communication system to fill in this gap and empower the deaf community. By converting spoken audio messages into Indian Sign Language (ISL) images and vice versa, we strive to provide an effective means of communication for users whose primary form of communication is sign language. This system allows the group of deaf people to enjoy all sorts of things that normal people do from daily interaction to accessing information. This application takes speech as input, converts it into text and then displays the Indian Sign Language images.

- Speech which is taken as input.
- The speech is recognized using Google Speech API.
- The text is then pre-processed using NLP (Natural Language Processing).
- Finally, Dictionary based machine translation is done.

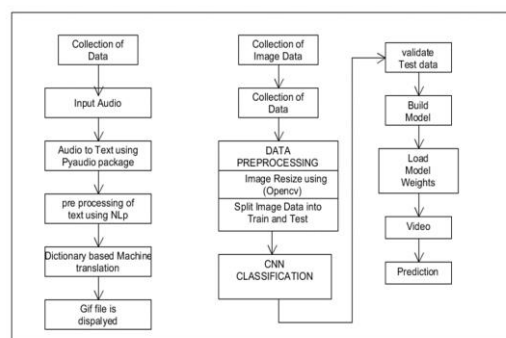


Fig. 1(a): Project Workflow Diagram

## II. PROBLEM STATEMENT

Deaf persons can communicate via sign language by utilizing their hands faces or eyes in addition to their vocal tract a sign language recognizer tool is used to identify sign language used by the deaf and the dumb since it might be difficult

to distinguish a foreground object from a busy background gesture recognition is an essential topic. There is a difference when human looking at an image and a computer looking at an image. For Humans it is easier to find out what is in an image but not for a computer. It is because of this; computer vision problems remain a challenge.

### III. RELATED WORK

[1] The paper introduces an innovative solution, "Audio to Sign Language Translation for Deaf People," aiming to bridge communication gaps between the deaf and normal-hearing individuals. The system converts audio messages into Indian Sign Language (ISL) images or GIFs. Using technologies like speech recognition, natural language processing (NLP), and machine translation, the system processes audio input, recognizes speech, preprocesses text, and translates it into ISL representations.

[2] The paper introduces a program that converts voice input into Indian Sign Language (ISL) for the hearing-impaired. It addresses the scarcity of text-to-sign conversion systems due to a absence of sign language dictionaries. The process involves converting voice to English text, parsing sentences, applying ISL grammar, stemming words, and matching them to an ISL video dictionary. The research underscores the significance of sign language in addressing communication obstacles especially within the context of India. The method's steps and results are detailed, highlighting around 95% accuracy for voice-to-text and 70% for text-to-ISL conversions.

[3] This paper addresses the challenge for deaf and mute people to communicate individuals and the general population. It proposes a solution converting sign language cues into text and speech for effective communication. The paper investigates numerous methods for identifying hand gestures, including glove-based, vision-based, and hybrid approaches. Glove-based methods involve different types of gloves, while vision-based techniques use CMOS cameras. The hybrid approach combines the strengths of both methods.

[4] The paper introduces the D-Talk system, an application using artificial intelligence (AI) to assist people with speaking and hearing impairments. Communication barriers are highlighted, and the need for inclusive technology is emphasized. D-Talk's main goal is to enable the hearing and mute to interact effectively, using hand gestures and AI. The application detects hand movements through webcams, recognizes gestures, an equivalent translation actions like browsing websites. The system utilizes machine learning techniques, such as skin color extraction and contour tracking, to identify gestures and execute commands.

### IV. PROPOSED SYSTEM

In this project we introduce new technology that is audio to interpreter for sign language using python.

1. In this it takes audio as input, search that recording using Google API, display the text on screen and finally it gives sign code of given input using ISL (Indian Sign Language) generator. After that, each word in the sentence is compared to those in the dictionary that contain images and GIFs representing the words. If the words are not found, its corresponding synonym is replaced. The set of gestures are predefined in the system.

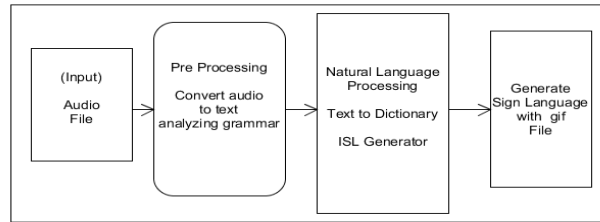
2. We are going to consider the sign language of India image as input and convert that into text/speech.

#### **Proposed System and Advantages**

Our proposed system offers a comprehensive solution that overcomes the limitations of existing systems. By employing advanced technologies such as Natural Language Processing (NLP) and machine translation, we enable instantaneous conversion of audio messages to the sign language of India images. Not only does this system make it easier to communication between hearing and deaf individuals but also empowers the deaf community to engage in daily interactions, access information, and learn language basics. The use of predefined ISL gestures ensures accurate and coherent translations.

### V. METHODOLOGY

In the first section, titled "Audio Message to Sign Language Conversion," the project aims to develop a system that can convert audio messages into sign language representations through a series of well-defined steps. This comprehensive process involves users providing audio messages through a graphical user interface (GUI), followed by the conversion of the audio input into text, splitting the text into individual words and storing them in a dictionary.



Subsequently, dependency parsing techniques are applied to unveil the syntactic relationships between words, aiding in the understanding of sentence structure and context. Natural Language Processing (NLP) techniques, such as removing stop words, tokenization, and text cleaning, are then employed for text pre-processing. The pre-processed text is further translated into Indian Sign Language (ISL) using machine translation guided by ISL grammar rules. Finally, based on the translated text, the system generates corresponding ISL sign language representations presented as GIF files, visually depicting the gestures (Fig. 1(b) Audio to text).

The second section of the project focuses on translating images or videos into either text or speech, with a specific emphasis on assisting individuals with hearing impairments and speech impairments. This process extensively relies on computer vision techniques and Convolutional Neural Network (CNN) algorithms to identify Indian Sign Language (ISL) gestures within videos.

The step-by-step process begins with the collection of Indian Sign Language datasets from deaf and dumb individuals, potentially from sources like Kaggle. These datasets typically consist of various classes of ISL gestures. Subsequently, the collected image datasets undergo pre-processing techniques, including image resizing, noise removal, and conversion to grayscale, to enhance the machine learning model's performance.

The pre-processed data is then split into training and testing sets, facilitating the model's learning from a designated training dataset and its evaluation based on accuracy using the test dataset. CNN algorithms are employed for training, enabling the model to recognize patterns and features in ISL gesture images effectively.

Following training, the model's accuracy is assessed through evaluation, and if it demonstrates high accuracy, it is constructed and stored within the system. This trained model serves as the foundation for recognizing ISL gestures within videos.

Users provide input in the form of videos, which are treated as sequences of frames. Each frame is individually processed by passing it through the trained CNN model for gesture recognition. The model is capable of detecting and classifying ISL actions within the frames.

Finally, once the ISL gestures are understood and recognized, they are converted into corresponding text or speech output. This conversion represents the translation of the ISL gestures captured in the video, ensuring that the information is accessible to individuals with hearing or speech impairments.

## VI. EXPERIMENTAL RESULTS

- The framework is designed to interpret hand motions performed by individuals with speech and hearing impairments.
- Notably, the system doesn't require users to wear gloves or any other electromechanical devices.
- The speech input is processed by the system and converted into corresponding alphabets.
- This conversion allows the system to display the corresponding hand gestures, making them visible to the deaf community.
- For instance, if the user speaks "Riya," the system translates it into individual alphabets: R, I, Y, A. The system then matches these signs with its database to generate an output.

## VII. CONCLUSION

In the culmination of this endeavor, "Smart Translation for Physically Challenged People" emerges as a resounding testament to the harmonizing potential of modern technology. It embarks on a mission to dissolve the walls of communication that encircle individuals facing hearing and speech impediments. Armed with an arsenal of cutting-edge tools, including audio processing, natural language processing (NLP), machine translation, and computer vision, this project orchestrates a symphony of connection.

At its core, this initiative doesn't merely bridge linguistic chasms; it forges pathways to a world where expression knows no bounds. It's akin to crafting a new language, one where understanding flows freely between the spoken word and the beauty of sign language. As the digital tapestry of innovation unfurls, so too does the promise of an enriched existence for those who have long grappled with the limitations of traditional communication methods.

In this narrative of progress, "Smart Translation for Physically Challenged People" takes center stage as a masterpiece of human empathy and ingenuity. Like a guiding star, it illuminates a path to empowerment for those who have been marginalized by communication barriers. It's a testament to the belief that technology, wielded with compassion, can foster profound change. As the final notes of this project's symphony echo, they carry a message of transformation, hope, and unity. Through the fusion of advanced technology and unwavering commitment, this initiative serves as a beacon of possibility, forever altering the way we perceive communication, connection, and the boundless potential of human collaboration.

In the rapidly advancing field of assistive technology, this project serves as a significant contribution towards inclusivity and accessibility. It not only provides an innovative solution but also paves the way for further advancements in the domain of communication aids for physically challenged individuals. The successful implementation and promising results of this project highlight its potential to make a meaningful impact on the lives of people with hearing and speech impairments.

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