

AUDIO TO SIGN LANGUAGE CONVERTOR

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Abstract – Hard of hearing individuals continuously miss out the fun that ordinary individual does, be it communication, playing computer recreations, going to courses or video conferences, etc. Communication is the foremost imperative trouble they face with ordinary individuals additionally each ordinary individual does not know the sign dialect or how to communicate with them. The point of this extend is to create a communication framework for the hard of hearing individuals so that they can communicate with typical individuals. It changes over the audio/voice message into the sign dialect. This framework takes sound as input, changes over this sound recording message into text and shows the significant Indian Sign Dialect pictures or GIFs which are predefined. By utilizing this framework, the communication between typical and hard of hearing individuals gets simpler.

1. Introduction – It is said that sign dialect is the mother tongue of hard of hearing individuals. This incorporates the union of hand developments, arms or body and facial expressions. There are approximately 300 diverse sorts of sign dialect utilized around the globe nowadays. A few of them are American Sign Language (ASL), Indian Sign Language (ISL), British Sign Language (BSL), Australian Sign Language (Auslan) and numerous more. In this python venture, we are utilizing Indian Sign Language data sets from google, this incorporate certain predefined GIFs and sign language for lower case alphabets.

This application takes audio as input and changes over it into content and after that shows Indian Sign Language images of GIFs.

- The front end of the system is made using EasyGui.
- Audio is taken as input through microphone using PyAudio package.
- The audio is recognized using Google Speech API.
- The text is then pre-processed using NLP (Natural Language Processing).
- Finally, Dictionary based machine translation is done.

2. Sign Language – Sign Dialect is utilized by hard of hearing individuals to communicate. It may be a combination of visual motions like hand movement, facial expression etc. It is the noblest blessing god has given to hard of hearing individuals. There are numerous diverse sign dialects in world for case British and American sign dialects. British Sign Language (BSL) isn't effectively coherently to clients of American Sign Language (ASL). Not at all like ASL, BSL employments a two-handed letter set. In creating nations, hard of hearing people may utilize the sign dialect of teacher from somewhere else within the world. For case, A few hard of hearing people in Madagascar utilize Norwegian sign Dialect. By differentiate, hard of hearing children in Nicaragua have made their possess sign dialect.

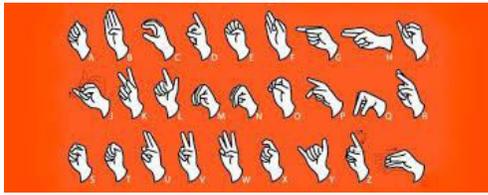
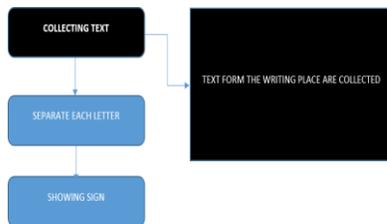


Fig. 1 (a): Sign Language

Sign dialectal recognizer tool is used for identifying sign language of hard of hearing people. Gesture recognition is a significant topic due to the fact that segmenting a foreground object from a disorderly background is a puzzling problem. There is a difference when person looks



at an image and when a computer looks at an image. For people 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 challenging issue.

Fig. 1 (b): Block diagram of Text Collection

Fig.1 (b) shows how system takes audio as input and search that audio recording.

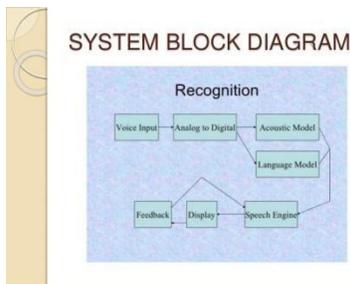


Fig. 1 (c): Block diagram of Text Separation

Fig. 1(c) shows the sentence or word recognized through audio input is separated into separate letter and then kept in an array.

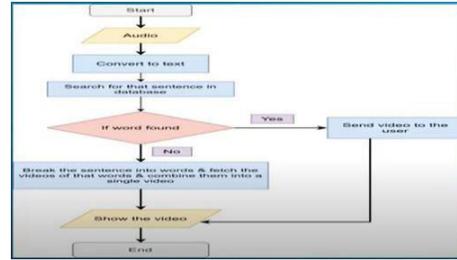


Fig. 1 (d): Flow Chart of Sign Language of

Sign Language conversion

Fig. 1(c) shows the flow of the program. First the system takes audio input from user. It converts the audio to text using google api. After converting audio to text, it looks for the text in the predefined GIFs Dataset, if the text is found the GIF is displayed otherwise it will break the string into small substrings and looks for their corresponding sign and displays it.

Fig.2 shows the predefined gestures that are used in this project. As per the audio input given, it shows sign code. [

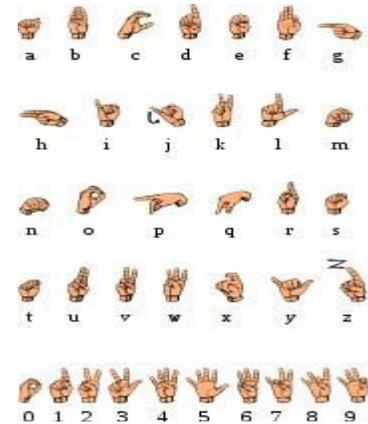


Fig.2: Predefined gestures

Lexical selection is done-

• **English** "I had dinner with Mina"

ISL "I MINA WITH NIGHT FOOD FINISH"

Subject-Object Verb (SOV) pattern is preferred by ISL.

• **English** "I have a television"

ISL "I TELEVISION HAVE".

However, the order of words depends upon the verb and its direction as below.

• **English** "I help you"

ISL “Self HELP Front”

3. Proposed Solution – Objective of this project is to help people facing problem of hearing. There have been many systems developed on the sign languages that takes sign language as input and converts it to text or audio as output. But audio to sign language conversion systems have been rarely developed. It is useful to both normal and deaf people. It can also be used to learn sign language In this project we made an application that is used to convert audio to sign language using python. 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. All the words in the sentence are then checked against the words in the dictionary containing images and GIFs representing the words. If the words are not found, its corresponding synonym is replaced. Set of gestures are predefined in the system.

This project does not focus on facial expressions, though it is well known that facial expressions convey important part of sign language. This system can be implemented in many areas including Accessing Government Websites wherein no video clip for deaf and mute is available or filling out forms online where no interpreter is present to help, at hospitals, banks , in news channels etc.

Procedure

1. **Audio to Text Conversion:**
 - Audios input is taken using python PyAudio module.
 - Conversion of audio to text using google API
 - Dependency parser is used for analyzing grammar of the sentence and obtaining relationship between words.
2. **Text to Sign Language:**
 - Speech recognition using Google Speech API.
 - Text Preprocessing using NLP.
 - Dictionary based Machine Translation.
 - ISL Generator: ISL of input sentence using ISL grammar rules.
 - Generation of Sign language with signing Avatar.

4. Implementation and Result – Output generation

Output for a given English text is produced by

generating its equivalent sign language depiction.

The output of this system will be a clip of ISL words. The predefined database will be having video for each and every separate alphabets in lower case and the output video will be a merged video of such words.

- 1) Fig.3 shows the front end of the system which is designed using EasyGui.

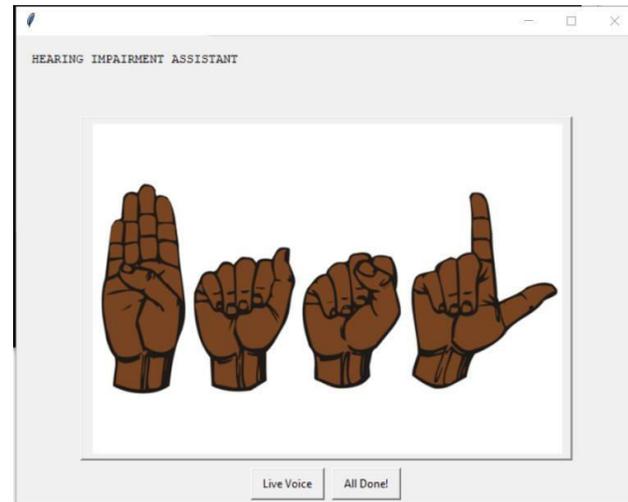


Fig.3: Front end

- 2) Fig.4 shows speech which is taken as input through microphone using PyAudio package.

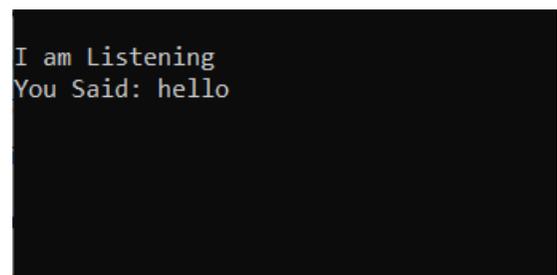


Fig.4: Speech Input

- 3) Fig.5 shows the speech is recognized using Google Speech API.

Google Speech-to-Text feature converts audio to text by applying neural network models in an easy- to-use API.

Fig.5: Google Speech-to-text

- 4) The text is then pre-processed using NLP (Natural Language Processing).

As we know that Machine can only understand binary language (i.e.0 and 1) then how can it understand our language. NLP was introduced to make it possible for machine to understand human language..

Natural Language Processing (NLP) is the branch of artificial intelligence that deals with interaction between human and machine. It is the ability of the machine where it processes the text said and structures it. It understands the meaning of the words said and accordingly produces the output.

Text preprocessing consists of three things- Tokenization, Normalization and Noise removal as shown in Fig.6. Natural Language processing is the mixture of artificial intelligence and computational linguistics. But actually how it works with this project is very important. NLP can do additional functions to our language. We will get our information after giving audio input based on the NLP devices to understand human language. For example, Cortana and Siri.

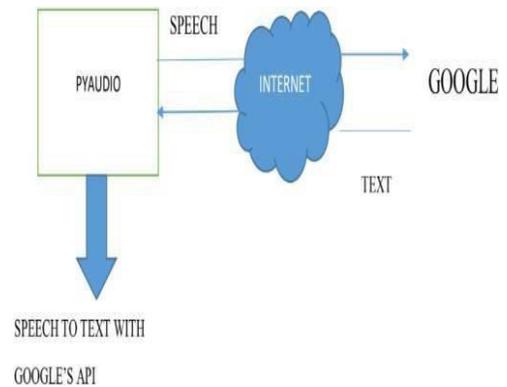
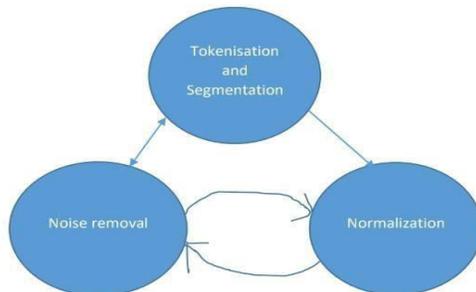


Fig.6: Text pre-processing

It is not an easy task for the machine to understand human language but with the help of NLP, it becomes possible. Actually how it works is shown below:

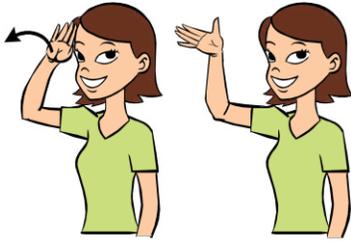
- We give audio as input to the machine.
- The machine records that audio input.
- Then machine translates the audio into text and shows it on the screen.
- The NLP system parses the text into components; understand the context of the conversation and the intention of the person.
- The machine decides which command to be executed, based on the results of NLP.

Actually NLP is process of creating algorithm that translates text into word labelling them based on the location and function of the words in the sentence.

Human language is converted meaningfully into a numerical form. This allows computers to understand the nuances implicitly encoded into our language.

- 1) Dictionary based machine translation is done finally.

When you say hello following output is shown:



When you speak “How Are You” as input into the microphone, the following output pops up as separate letters-

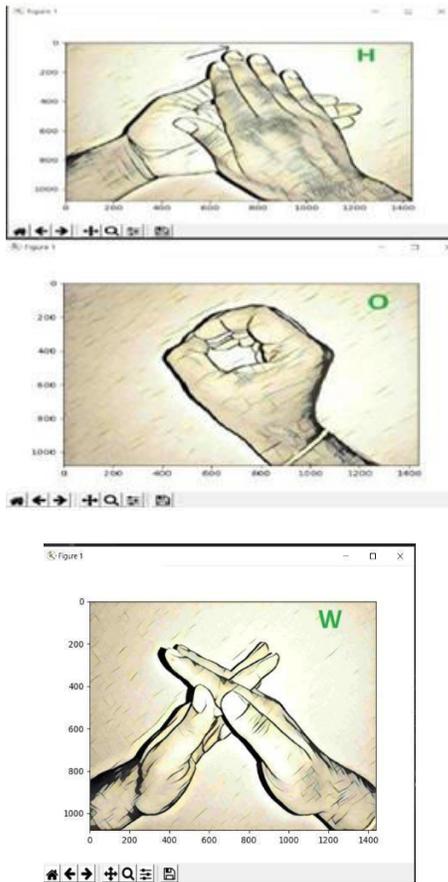


Fig.7.1: Output sign (HOW)

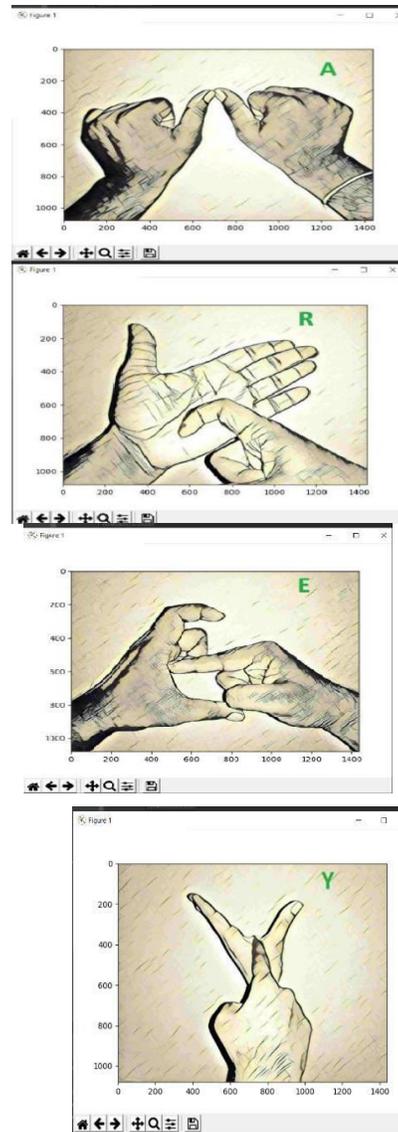
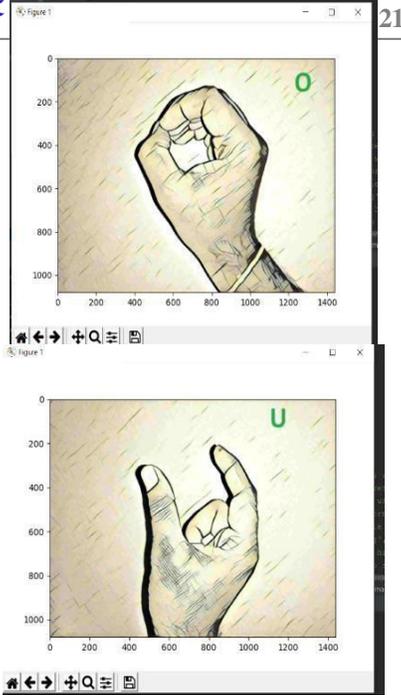


Fig. 7.2: output Signs(ARE)



5. Conclusion –Sign Language convertor is very useful. Deaf people always face communication problem in places like hospital , market and shops. There is always a communication gap between deaf people and normal people. Audio to Sign language convertor is like a bridge that fills this communication gap. It can be used in places like hospital, shops and other public places.

6. Future Scope – The future scope is to develop a system that can be used on news channels so that deaf people can also understand the news. Traditionally an interpreter converts the news to sign language but this system can replace the interpreter and thus is cost efficient.

7. References –

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