Spoken English to Indian Sign Language Translator

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Abstract.

Normal and hearing disability people's communication involves the use of sign language gestures. The medium of communication between hearing, speaking disabilities and normal people to convey their thoughts and feelings is Sign Language. But often, people have a hard time understanding hand gestures made by the people with disabilities because they don't know the interpretation of those sign language symbols. Usually, when a normal person wants to communicate with a deaf community, it is very necessary to translate those spoken words into Indian Sign Language Gestures because they find it very difficult if they are unaware of the meaning of sign symbols. To help people with special disabilities and to communicate effectively with those around them, a system that translates a normal person's spoken words in English into text and Indian Sign Language (ISL) gestures is necessary. English letters from(A-to-Z) have been proposed in this paper. This approach takes spoken English sentences as input, transforms that voice clip into textual characters, and shows predefined appropriate Indian Sign Language gestures. Communication between regular people and deaf persons is simplified using this system.

Keywords. speech-recognition, text-gestures, speech-to-text, google-speech-api, python3.

1.   INTRODUCTION

Sign Language recognition relies on gestures. This translator can be implemented in numerous elements of society. The strategy for communication between incommunicative and general folks is signing, which is an abstract entity that will be mapped to language communication whose origin depends on the "Sign" or "Gestures."

There are many one-of-a-kind signal languages used across the world, every with its personal vocabulary. This is due to the fact signal languages have been evolved certainly with the aid of using human beings belonging to one-of-a-kind ethnic groups.

Examples of diverse sign languages include Indian Sign Language (ISL), American Sign Language in North America (ASL), British Sign Language in the United Kingdom (BSL), and South Africa. Sign language (SASL). We advise an Indian Sign Language based translator that serves as an interface among the Deaf-dumb network and the overall public.

The Indian Sign Language has a low literacy rate, which is thought to be due to the

following factors:
1) Insufficient ISL interpreters
2) The ISL device is not available.
3) There aren't enough studies on Indian Sign Language.
Hard-of-hearing people use Indian Sign Language (ISL), a visible language focused mostly on gestures and motion, as their major mode of communication. Indian Sign Language is the most widely used sign language among the Indian subcontinent's deaf community.
In addition to fingerspelling, ISL includes gestures at the sentence level. For sentences, which does not have direct sign language conversion, for which the signer is unaware of the movements, and for interpretation of a particular word, fingerspelling is utilised.
Hand gestures in Indian Sign Language are classified into two groups: static and dynamic gestures. The English alphabets of static Indian Sign Language hand gestures (A-Z) are showed in Fig. 1.
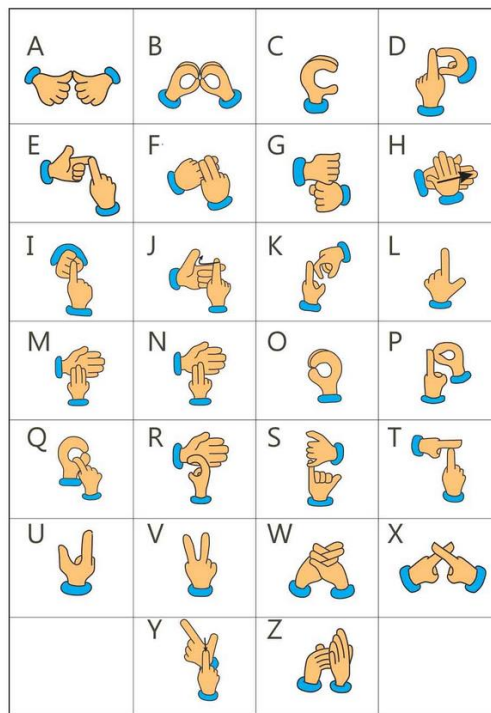

Fig 1: Poster of the Manual Alphabet in Indian Sign Language (ISL).[6]

People with speech and hearing disabilities tend to isolate themselves and feel lonely because they have difficulty talking to others. This has a significant impact on their lives. Because of the above-mentioned difficult scenarios that specially challenged people confront, this research proposes an automatic real-time system that can assist in translating spoken English phrases into Indian Sign Language gestures.
This translator enables people with disabilities to communicate with others successfully. Speech to Gesture translation is performed using the described methodology. We used the Google Speech Recognition API to translate spoken words in English to ISL gestures. This study focuses on the most accurate translation of

spoken English words to Indian Sign Language movements as accurately as feasible.

2.   LITERATURSE SURVEY

Paras Vij et al. [1] designed a two-phase sign language generation technique The initial phase involved pre-processing 2 Hindi Sentences and translating them into ISL grammar. WordNet and Dependency Parser have been combined to complete this task. In the Dependency Parser, dependency graphs represented words and their relationships between head words and words that affect those heads. HamNoSys was utilised in the second phase to translate this syntax into respective Sign Language. The symbols generated were translated by SIGML to form XML tags. A 3D rendering software can then read the XML tags form.

MS Anand et al. [2] proposed a double phase ISL conversion system. In speech-to-sign module the input voice was fed to the noise removal sub-module. After that, the output was sent into a speech recognizer, which decoded the input voice and converts to phrases sequence. A rule-based technique was used to turn the sequence of phrases into a sequence of sign symbols in a natural language. Finally, using the sign animation module the animated signs were displayed with text annotation respectively.

Ankita Harkude et al. [3] built a system that takes input as voice, transforms that to text, and a set of pre-labelled Indian Sign Language Pictures or GIF's are displayed. Communication between normal and deaf community is made easier using this system. After then, all the words in the sentence are compared to words in a lexicon that includes images and GIFs that represent those words. synonym's will be used , If the terms aren't recognized. The system has a set of gestures that are pre-labelled.

Supriya Pawar et al. [4] proposed a camera-based hand gesture recording system. Image processing of the captured gesture is performed. Then, sign recognition and conversion of signs to text and voice are done. The final result is amplified voice equivalent to each processed gesture. This project aims to develop a useful tool that uses gesture recognition to reduce communication barriers between the deaf and dumb community. This project is a prototype to verify the feasibility of gesture recognition by image processing.

Dhivyasri et al. [5] proposed Support Vector Machine, for gesture to text conversation and for speech to gesture conversion, Google Speech Recognition API were used. The proposed application can read Indian Sign Language. As a result, a more valid sign language interpreting application was created.

3.   METHODOLOGY

Our goal is to help people who are with hearing disability. There are many sign language projects that transform by sign language symbols as input to output as text or voice. However, voice/speech-to-sign language translation systems are developed hardly. These kinds of systems can be useful for both ordinary people and mute people. This study will introduce a new approach that takes spoken English words or phrases to sign language translator. It takes spoken English words as input, searches with Google APIs, displays text on the screen, and finally, with a short delay, outputs the character sign gestures of the input specified in ISL (Indian Sign Language). This work did not focus on facial expressions.

3.1.   Procedure

The user's speech is received through the device's microphone and passes through the voice-to-text model. The textual content generated from the speech is then analyzed to extract letters from the word. Then speech recognition using Google Speech api is done, later the input spoken characters are mapped with predefined labelled sign gesture images and displays the relevant sign symbols respective to the characters sequence of the speech received with a certain delay.
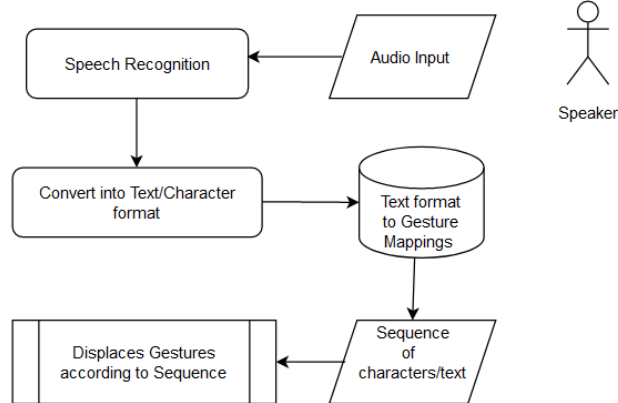

Fig: Block Diagram

3.2.   Algorithm

Step1: Start
Step2: Getting the Input
       1. Listen the Speech (Spoken English) using Microphone.
Step3: Recognize the Speech.
Step4: Convert Spoken words to Text/characters.
Step5: Text and Characters Detection.
       1. Display the Letters of the Word/Phrase.
       2. Display the Visual of the phrase with some delay of Actions.
       3. Repeat all the steps from Step 3 and continue till the Speech Ends.

       4. If Error in Step 2, That is if no Speech Detected then display error message "Sorry, I did not get that, please try again".

4.   IMPLEMENTATION AND RESULTS

The appropriate Indian Sign Language symbols are generated as output from the received spoken English sentences as input. This system's output is a constant display of ISL gestures of the input speech characters respectively.

Fig2: Displays the words extracted from the input

The Google Speech-to-Text feature uses a Neural Network Model for converting audio into text. An active internet connection is needed for this. The utterance time is set to 7 seconds. That is, the user has 7 seconds of time to speak out the words as input into the microphone. Then Google speech recognition API converts the input voice to text. Next, the output is the set of Indian Sign Language gesture that are equivalent to the characters of the text.

Figure 3 shows a screenshot of the implementation of the voice gesture conversion for the word "Reva University".

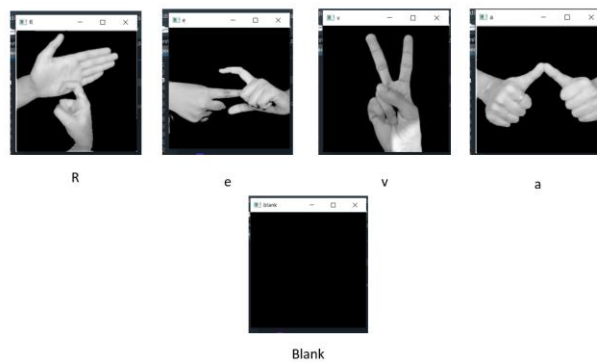Fig 3(i): The characters in the spoken speech

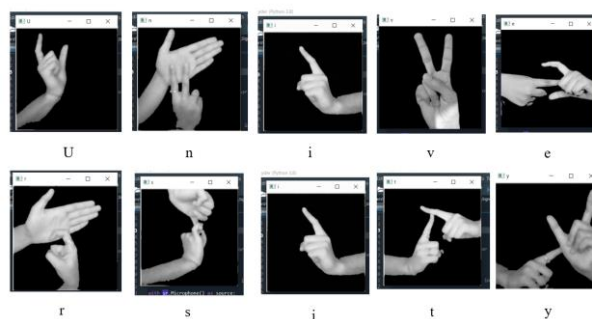Fig 3(ii): Displaying relevant ISL Symbols for the text Reva and Blank.

Fig 3(iii): Displaying relevant ISL Symbols for the text University.

5. ACKNOWLEDGMENT

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6. CONCLUSION AND FUTURE SCOPE

Our paper's main aim is to underline the need of Indian Sign Language Translators and to propose a practical method for converting spoken English phrases into Indian Sign Language symbols. Many languages, such as ASL, have benefited from extensive research, whereas ISL has received less attention. The development of this proposed method will aid in bridging the communication distance among the hearing and speech challenged community and others. In many public areas, a sign language translator is quite useful for effective communication between general and impaired persons.

The goal for future is to build an end-to-end system that converts Indian Sign Language Gestures to Speech with at most accuracy and then integrating both Sign language Gestures to Speech and Speech to Sign Gestures as one application. We also aim to expanding the project by incorporating facial expressions as well.
This application/system is beneficial for two-handed Sign gestures in both directions for efficient communication between disabled and non-impaired people.

7. REFERENCES

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