

Multiple Languages to Sign Language Using NLTK

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ABSTRACT

Sign language involves visual gestures and signs that deaf and mute people adopt as their first conversation. People other than deaf or hard of hearing can also use sign language, like, people suffering from autism, apraxia of speech, cerebral palsy or down syndrome. It entails hand gestures, non-verbal communication or physical movement, and face emotions all at the same time. It may be used by communities who have difficulty to speak, those who can hear but cannot talk, and helps normal individuals to interact with hearing impaired people. There are several groups of hearing-impaired people throughout the globe, and each community's language is unique. American Sign Language (ASL) is utilized throughout United States; British Sign Language (BSL) is a form of communication in the United Kingdom; Australian Sign Language (AUSLAN) is used in Australia; and Indian Sign Language (ISL) is used in India. ISL signs are divided into three categories: one handed, two handed, and non-manual signs. One-handed and two-handed signs are sometimes known as manual signs. Changes in body position and facial emotions provide non-manual indicators. This translator converts English text to Sign language, allowing hearing-impaired persons in India to engage with others. This application takes multiple languages as input and gives signs as information.

Keywords: Sign Language, Natural Language Processing (NLP), Asynchronous Server Gateway Interface (ASGI), Webserver Gateway Interface (WSGI).

I. INTRODUCTION

Sign language is used by deaf and mute individuals to converse with one another and with ordinary people. Additionally, several racial minorities with extremely different phonologies have used sign languages to

communicate with other ethnic communities. Phonology refers to the study of substantial sounds in human words. The phonology of sign language can be determined. Morphemes, other than sound, are individual signals in addition to hand signs. Deafness and dumbness have existed from the dawn of time,

but interaction and teaching of deaf people was first documented in the 16th century. Sign Language has evolved into a concealed language. Deaf pupils utilized Sign Language beyond schools, and it evolved into a living and global language. While creating a symbol, four key points must be addressed. These are: hand, positioning, action, and direction modes. Finger spelling in Sign Language refers to the manner in which the alphabet's 26 consonants are produced on the fingertips. Finger spelling is used to express people's names, places, concepts, and phrases but there are no indications or however there are no signs. Sign Language is not the same as finger spelling. It is a code switch approach in which you symbolize the printed English word in space while finger spelling an English phrase. Finger spelling is limited to those (deaf or mute) whose lives have been exposed to textual English or another spoken language.

SCOPE OF THE PROJECT:

Our goal is to understand the daily issues that particularly abled individuals encounter and to create an answer that is a. cost-effective, and adjustable by individuals, and simple to execute. Recognizing and meeting the needs of the handicapped population is critical to making a contribution. To improve the health of the body and mind, as well as the general quality of life, of persons with disabilities.

Objective:

A user gives voice or text as input. The microphone records data. The system then converts the speech to text and gives it to the application. Based on the NLP findings, the NLP engine pre-processes the language into portions, assesses the context of the discussion and the person's goal, and then picks which instruction to execute. Essentially, natural language processing (NLP) is the process of creating an algorithm that identifies words based on their function in sentences and sign language is displayed to user.

II. Literature Survey

In India, there is notably less study on sign language, particularly on the Indian Sign Language. Because each state in the nation holds distinct languages, so, India is regarded as a multilingual country. And also, each country and language have its own sign language. As, India was formerly a British Empire province, the sign languages of the two countries are very similar. The ISLRTC (Indian Sign Language Research & Training Center) aspires to balance programmed concepts and ISL implementation. In India, 3/4th of the 1.1 million deaf individuals are illiterate. In line with oralist theory, deaf schools attempt to intervene early with hearing devices, but this, in particular, does not apply to the population. Experts around the globe have endeavored to find a solution to this reason. The major difficulty in the transfer from Speaking English to Sign Language is the generation of terms that encourage translation by providing accurate ASL grammatical phrases.

This project does this by constructing a set of sentences using the principal method. Each phrase is tokenized, and for each token, we determine the section of speech to which it connects, after which certain actions are conducted (each word is transformed to its root word, and auxiliary verbs are removed). Any terms from Spoken English that are not listed in ASL lexicon are eliminated. Proper nouns (numbers of nations, cities, persons, and so on) are then delivered in a distinct format to represent sign language. Each proper noun is kept as two alphabets connected by a semicolon, and each alphanumeric is represented by a sign. For example, Jaipur (the city's name) is kept as J-A-I-P-U-R, matching to the usage of traditional sign language. The mechanism is meticulous and can only result in inaccuracy if a human error occurs. Human mistake can be apparent while developing an ASL glossary or manually storing data for each sign. We may notice an increase in effectiveness and time savings by employing a phrase-

based approach to avoid repetitive phrases, but generating still takes a long time [1].

Widely used NLTK packages are taken into account to develop a comprehensive and effective program. It began by turning audio input into text using the Google text to voice API. The suggested system tokenizes and applies rules to transform English to ISL sign compilation, using lemmatization and stemming. The output is then sent to the 'Hamburg Gesture Recognition Validates', a database searching tool. It is then transferred to the SIGML using, which makes use of avatars to elucidate sign language. Introducing an information exchange for people with impairments in order to make successful communication possible. It converts spoken (English) into three-dimensional avatar movement and displays Hindi (Indian) linguistic symbols rather than GIFs, photos, or videos [3]. Estimator IBM: In the context of semantics and syntax, the arrangement of words in the target text may not become a proper sentence. The ordering of lexemes is essential to construct a logical sentence from these frames. This is accomplished with the IBM Model -1. For example, "workers are" becomes "worker", "requested to" becomes "please," and so on.

III.OVERVIEW OF THE SYSTEM

3.1 Existing System

Current solutions: Since technology evolves rapidly, humans make innovations every year to help themselves and those who are disabled. We want to make it easier for deaf and mute individuals to interact with each other, so we designed a language translator that quickly transforms audio to sign language. For the deaf, sign language is their primary method to communicate. And also, people who are physically disabled may use sign language to express their emotions to others. It can be difficult to communicate because ordinary people can struggle to learn the specific sign language. Because sign language uses a range of hand motions and gestures, obtaining

the required precision at a reasonable cost has proven to be a colossal assignment. We already have physical software and hardware that can convert audio to sign language. As a result, we're upgrading the product using the processing of natural languages. The word library may be expanded to enclose a great majority of English terms that are often used. Speech to text - to - speech and language processing may be enhanced using various NLP methods.

3.1.1 Disadvantages of Existing System

- Makes use of data mining techniques and machine learning models.
- Only single language is taken as input, that is, English. For multi-language users, the application won't work.
- Reliability of text processing is poor.

3.2 Proposed System

The proposed system is an audio to sign language conversion system which take audio and text as input which supports multiple languages - Telugu, Hindi and English. This application takes voice as input and preprocesses data using NLTK techniques and provides sign language as output in a video format.

Advantages of Proposed System

- This application works on multiple languages – can preprocess Telugu and Hindi languages as input.
- Processed data is valid and sign language suggestion gives acceptable results.
- Processing time is faster when compared to the existing system.

3.3 Proposed System Design

In this project work, five modules are used and each module has their own functions, such as:

1. User Module
2. Speech Module

3. Multi language module
4. NLTK Module
5. Sign language Module

IV. ARCHITECTURE

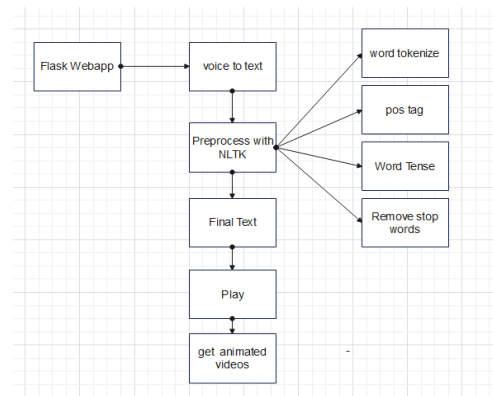


Fig 1: Framework of Audio to Sign language translator

3.3.1 User Module

In this module, user will register with the application and login with valid name and password and experience features like speech to text and spoken language preference.

3.3.2 Speech Recognition Module

In this module, the google speech to text conversion library is utilised to convert voice to text and data is processed to next step for NLTK processing and text is displayed to user.

3.3.3 Multi Language Module

In this step, user has an option to give input as Telugu, Hindi or English and convert that data to English and process data to next step.

3.3.4 NLTK Module

In this module, text is pre-processed by eliminating stop words and collect required words, and send to next step to get corresponding stored video based on key word from the system.

3.3.5 Sign Language Display Module:

Based on input from NLTK module, when submit button is clicked text, related videos are processed from the system and displayed to user.

V. RESULTS AND DISCUSSIONS

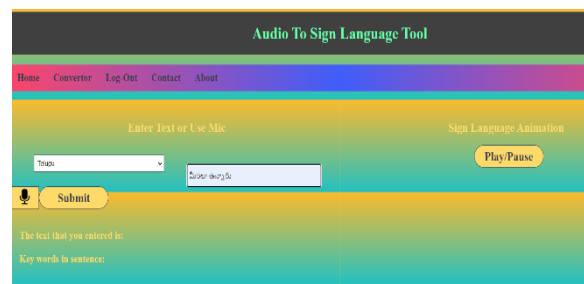
Home Page



Select Language:



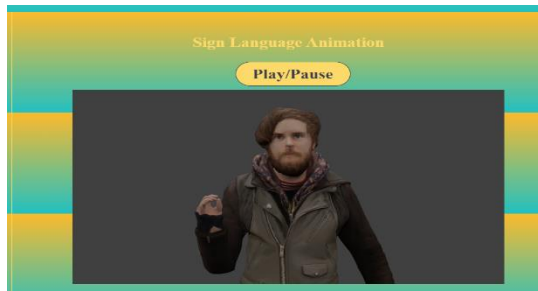
Input Telugu Language:



Preprocessed Data:



Result:



VI. CONCLUSIONS

A multiple language interpreter is useful in a numerous scenario. Anyone at universities, schools, clinics, institutions, airports, or tribunals could utilize this technology to learn and communicate in hand signals. It allows persons with normal hearing to interact with others who have troubled hearing. The website's UI will be revised hereafter, and new capabilities will be set in motion. There are other front-end alternatives available, including as.net or android apps, that may be anchored to make the system bridge and increase system availability. Although it is well known that face features are an important aspect of sign language, they were not the subject of this experiment. We are delighted to go on with the project by including expressions. In this project we have discussed multi languages as input and preprocess data to generate sign language for users who can only speak Telugu, Hindi or English.

VII. Future Enhancement

In the near future, this application can take all languages as input and an android app can be developed for suggesting a sign language.

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