SWE3999 – TECHNICAL ANSWERS FOR REAL WORLD PROBLEMS

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Proposed Methodology:

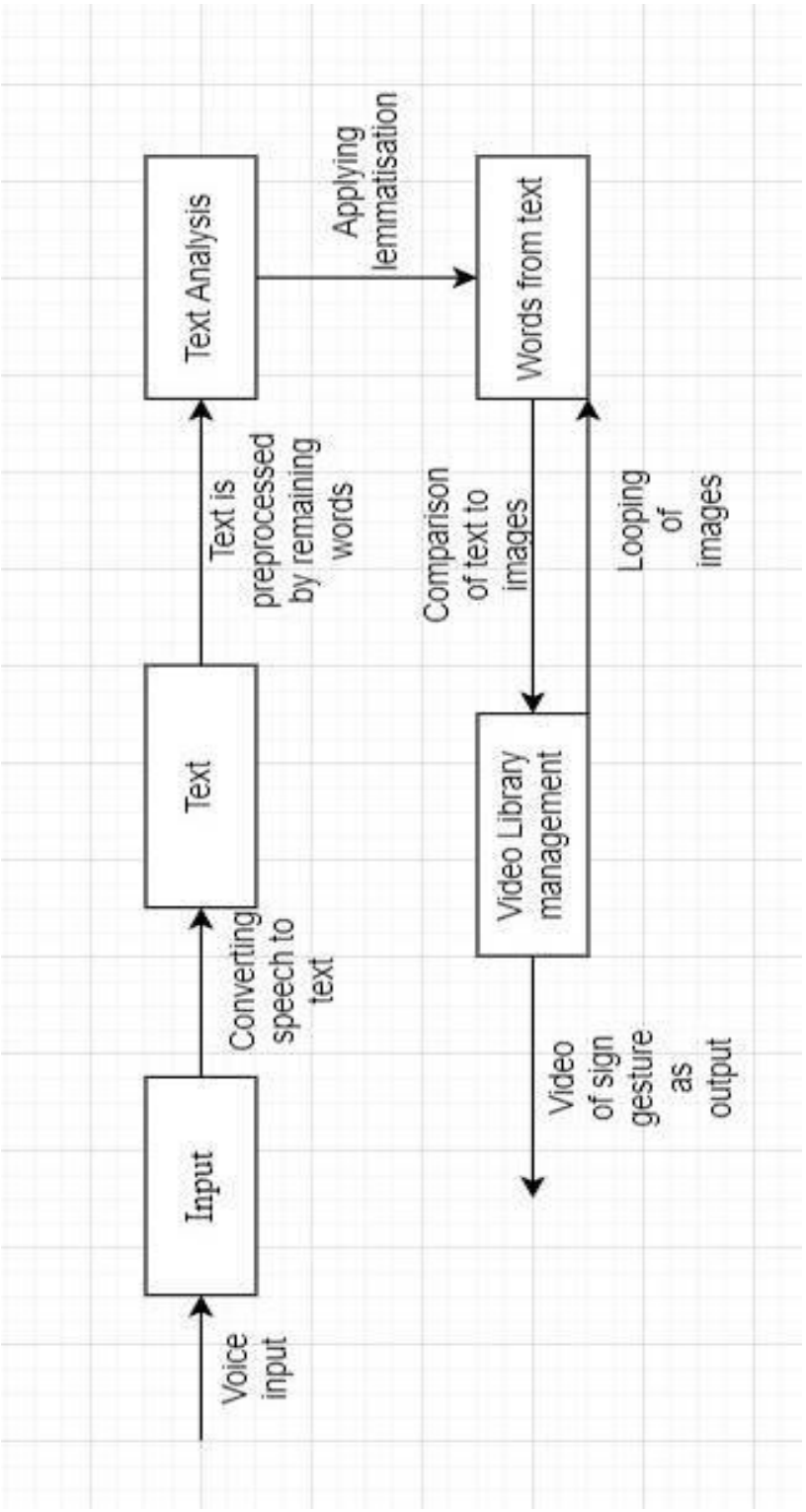
In this project, we will use the NLTK library and the JavaScript Web Speech API to create a web application that receives audio speech or text as input and translates it to equivalent Indian Sign Language for persons who are unable to talk or hear, as well as deaf people. First, we receive input in either audio or text format, as specified by the user. If the input is in the form of audio, we will use the JavaScript Web Speech API to transform it to text and show it on the screen. If the input is text-based, we will show it straight on the screen. The text input will then be processed using the NLTK library to break it into independent words without affecting the essential sense of the phrase, and the words will be shown on the screen. The animation that corresponds to the text will then be shown and played on the screen.

We will use HTML5, CSS, and JavaScript to develop a responsive UI for improved communication in our online application. HTML5 is used to create our project's web page, CSS is used to make our web application's UI more responsive, and JavaScript is used in the project for login/logout and sign in procedures. It also makes use of the Web Speech API to record audio speech and convert it to text representation.

We will be utilising the Lemmatization technique from the NLTK library to parse text. Lemmatization, in general, refers to doing things correctly by the use of vocabulary and morphological study of words. The ends of the words are deleted in this procedure to restore the base word, also known as Lemma.

We will present it in video format as the final outcome. However, we still have to determine whether to create a film of ourselves doing ISL motions or to obtain information from the internet. The visual output will be matched with the processed text words and presented on the screen.

Architecture Diagram:



Modules Involved:

1. **Getting input from User:**
    - Users can provide input in two ways. Users can use the mic symbol button to record the speech.

- Another way, User can type manually in the given text box.
- If User gives the input manually in the text box, the second module which is conversion of audio to text can be ignored.

2. **Conversion of Audio into text using JavaScript Web Speech API:**
   - When User gives input in the form of audio, then the audio will be converted to text and displayed in the given text box.
   - The audio can be recognized in various accents like American accent, British Accent or Indian Accent.
   - According to the accent, the text will be recognized from the audio and displayed.

3. **Text analysis by removing stop words:**
   - After recognizing the text from audio, the text will be analysed using the NLTK library.
   - In this module, the acquired text will be pre-processed by removing stop words from the text.
   - Stop words are a group of words that are widely used in a language. Stop words in English include "a," "the," "is," "are," and others.
   - Stop words are frequently used in Text Mining and Natural Language Processing (NLP) to exclude terms that are so widely used that they contain very little meaningful information.

4. **Text mining by applying lemmatization:**

- In this module, after removing stop words from the text, the pre-processed text will be processed using the lemmatization method which is available in the NLTK library.
- Lemmatization typically refers to doing things correctly by using a vocabulary and morphological analysis of words, with the goal of removing only inflectional ends and returning the base or dictionary form of a word, which is known as the lemma.
- The reason why we chose lemmatization over stemming is that Lemmatization accuracy is more as compared to Stemming, and Lemmatization would be recommended when the meaning of the word is important for analysis.

5. **Display the corresponding sign language video:**
   - After the text mining process is finished, all of the processed words will be saved in a list, and the text of sign language videos will be compared to words in the list.
   - Displaying the matching video to the user for the word in the list. There will be a play/pause button, and you will be able to pause and play the video whenever you like.

References:

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