SMART HACKS 2K24 β-EDITION

BASIC INFORMATION

Team Name: .pdf

Team Leader Name: Akhilesh Reddy

Domain: Full Stack development with ML

Problem Statement:
Communication tool for people with disability.

Institute Name:
Chaitanya Bharathi Institute of Technology

Analysis of Problem Statement:

In the problem statement, communication tool for people with disability, our focus went on to the people with hearing-disability by birth(i.e. who can't understand english and there primary way of communication is sign-language). We came notice that sign-language is one of most-used and efficient way to communicate with them.

But in the present scenario, we have many tools to understand sign lang(i.e. sign-to-text tools), but there's almost no way that sign people can get sign-lang from text. If they were able to get sign-lang from the text/audio, it would make them able to access a larger base of knowledge, say directly watching any youtube video without it being separately made accessible with signs.

Hence, we came to an analysis that this tool which can convert caption/text into any recognised sign-language would be a great tool for communication.

Literature Survey (Study of existing Solutions):

The existing solutions for them includes translation of the sign language to the normal english language such that the other persons can understand what they try to communicate and try to reply back in sign language.

There was a model, which used to convert text into sign-language in terms of video, i.e. the developer made recorded videos for every sign and made model, which responds the query of english by sending sign-video corresponding to each sign. This model is very inefficient as it downloads large packets of video data and renders again in user's system.

Our solution stands out different by making use 3D Avatar, we would be able to render the model once, and then on just sending packets consisting coordinates of hand movement which are generated from our model making it more efficient and fast.

Idea/Approach to solve Problem:

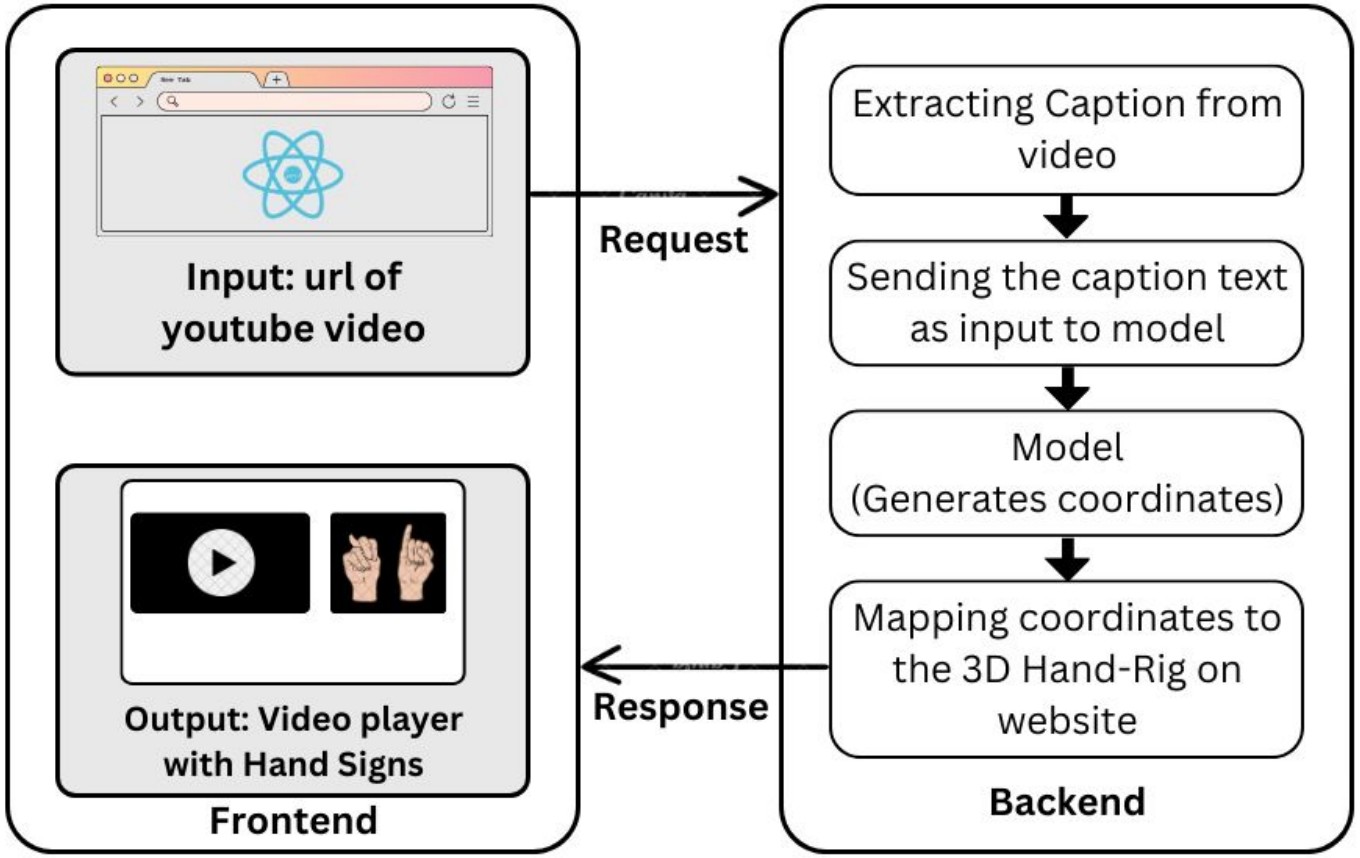
In our idea, we extract the text/caption from the youtube video and use it as input for the model. This ML model is trained upon the texts and coordinates of the hand movements.

The coordinates of hand movements are generated by using mediapipe hand landmarking model, and the coordinates are of certain fixed points of 3D model hand, for simulating the hand movement.

These coordinates generated from our Model are sent as input for 3D-hand model rendered at the user side in the webpage.

Technology Stack:

Data Flow



Tech Stack:

a) Frontend:
   i) React JS
   ii) Three JS

b) Backend:
   i) Firebase
   ii) Express JS
   iii) Hugging face

c) Training:
   i) Media-pipe Model
   ii) Tensorflow

Unique Value Proposition:

Our tool uniquely translates text and audio into sign language in real-time, enabling people with hearing disabilities to access a wide range of content directly. This bridges the communication gap, promotes inclusivity, and empowers users by providing seamless access to information and entertainment without the need for separate accommodations.

Cost of Implementation:

Basing on size of model:

- Small: Free Services available
- Large: Various with model-size and performance

Dependencies:

- Keras
- Scikit-Learn
- Related Huggingface models
- Mediapipe
- Pandas
- Blender

Project Outcomes:

This project enhances the accessibility by translating the text, audio into the sign language improving communication for people with hearing disabilities. I will provide inclusivity and user empowerment by enabling direct engagement with diverse content, such as online videos and audio lectures.

Real Life use cases (Societal Impact):

- **Bridging communication gaps:** facilitates the seamless communication between the people with hearing disability and the broader community.
- **Social Inclusion:** Promotes the social inclusion by enabling individuals with hearing disabilities to participate in social activities and events.
- **Employment Opportunities:** Increases the opportunities for the employment opportunities by enabling the individuals with hearing disability to comprehend job related materials and instructions.

Future scope:

- **Real-Time Translation Capabilities:** Enhance the tool to provide real-time translation of spoken and written language into sign language. This would enable seamless live conversations, such as during video calls, conferences, or in-person interactions, ensuring that people with hearing disabilities can participate fully.
- **Platform Integration:** Integrating with various platforms like streaming services, educational portals, and social media for broader accessibility.

Team Details:

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