Software and Tools

* **Programming Language**: Python, renowned for its robust libraries and community support in data science and machine learning.
* **Machine Learning Technique**: Tokenization, which involves breaking text down into manageable pieces (tokens) for more effective translation into signs.
* **Sign Language Package**: Utilization of a specialized ASL language package that provides pre-built gestures and expressions for translating tokens into sign language.

System Architecture

* **Input Module (main.py):** Accepts English text through direct input.



* **Processing Module (text\_to\_sign) Folder:** Uses ML tokenization to parse and convert the text into sign language tokens. These tokens are then matched with corresponding signs from the ASL package, adaptable for seq2seq learning, utilizes these tokens to align with corresponding signs through the creation of parallel datasets.

The system currently supports two distinct operational modes**:** the first mode translates a sequence of several words into one single expression, suitable for straightforward communications. The second mode, designed for more complex interactions, handles sentences with several words, converting them into several corresponding expressions the second mode usually works good in cases when number of words in the sentence is equal to the number of expressions ,a third mode can be used for reinfocement learning (to minimize the error margin), it has not been included as it’s more suited for experienced ASL translators (directly transcribing letter by letter each letter, marking a small pause to between translated sentences).

In the sections below we’re willing to disucuss each component in detail,

Basic Mode :

This mode translates a sequence of several words into a single expression, ideal for straightforward communications. This initial stage tests the algorithm's ability to condense multiple inputs into a succinct output, reducing the complexity of the expression while maintaining the integrity of the message.

Example « I am Hungry »

Presently, this multifaceted mode utilizes sk-l sign language, though further enhancements are planned to incorporate finger spelling by directly associating each letter with its video representation. Preliminary testing indicates that the performance of sk-l is comparable to that of ASL, despite the differences in sign language systems used.



* **Output Module**: Renders the translated signs into a video format using a digital avatar or animated character to perform the signs. This module ensures that the sign language is displayed in a clear and understandable manner.

Integration with Video Technology

Video Rendering: Integration with video rendering technologies to create smooth and accurate visual representations of the translated sign language. This involves animating a 3D model or avatar that performs the signs in real-time or through pre-rendered sequences.