



CBIT SUDHEE 2024 HACKATHON

NLP Solutions for Deaf People

AI, ML and Data Science

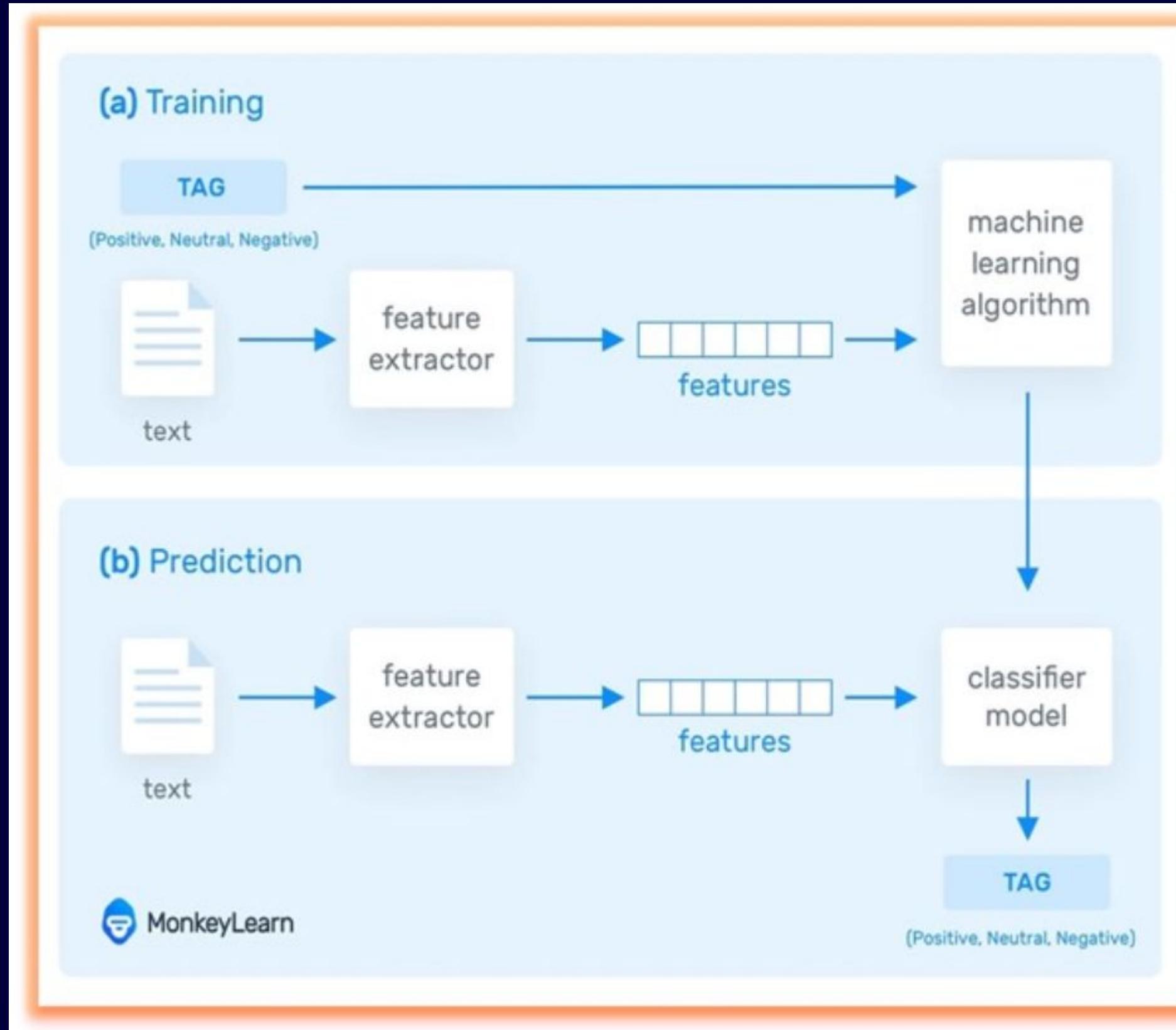
LOGICAL LEGENDS

SHUCHITA PRAKASH

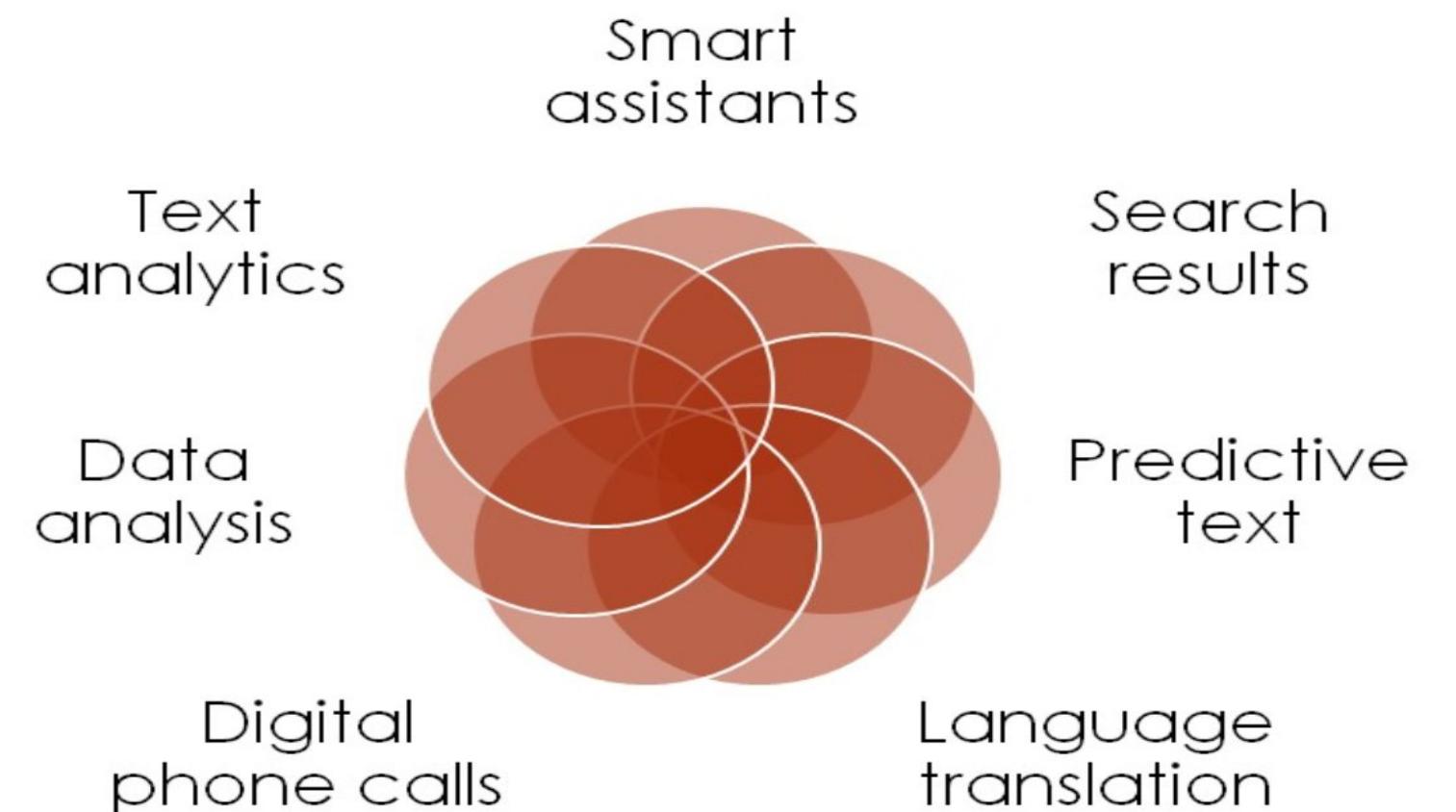
M.K. ANANYA

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NATURAL LANGUAGE PROCESSING



Natural language processing (NLP) refers to the branch of computer science—and more specifically, the branch of artificial intelligence or AI—concerned with giving computers the ability to understand text and spoken words in much the same way human beings can.



PROBLEM STATEMENT

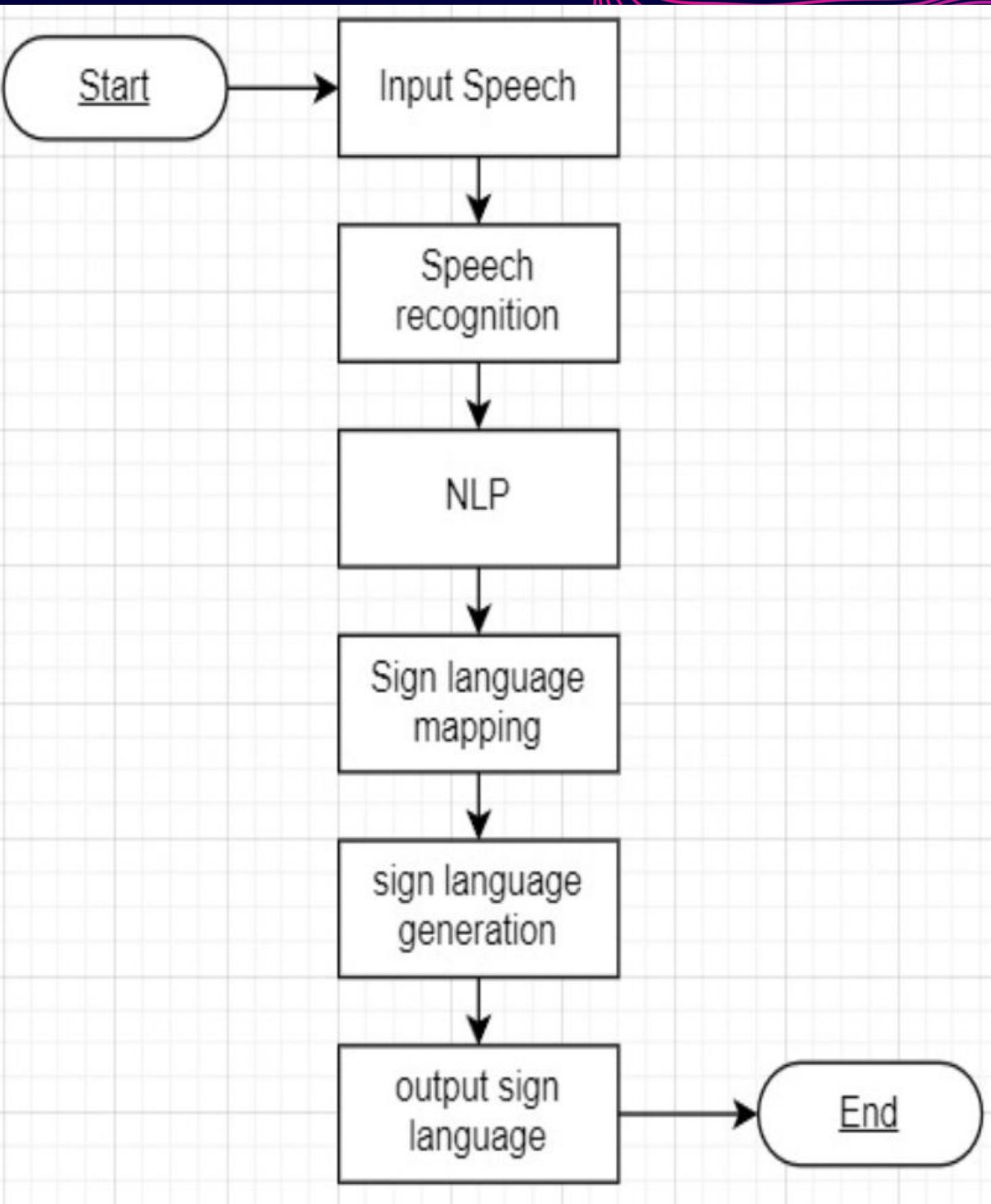
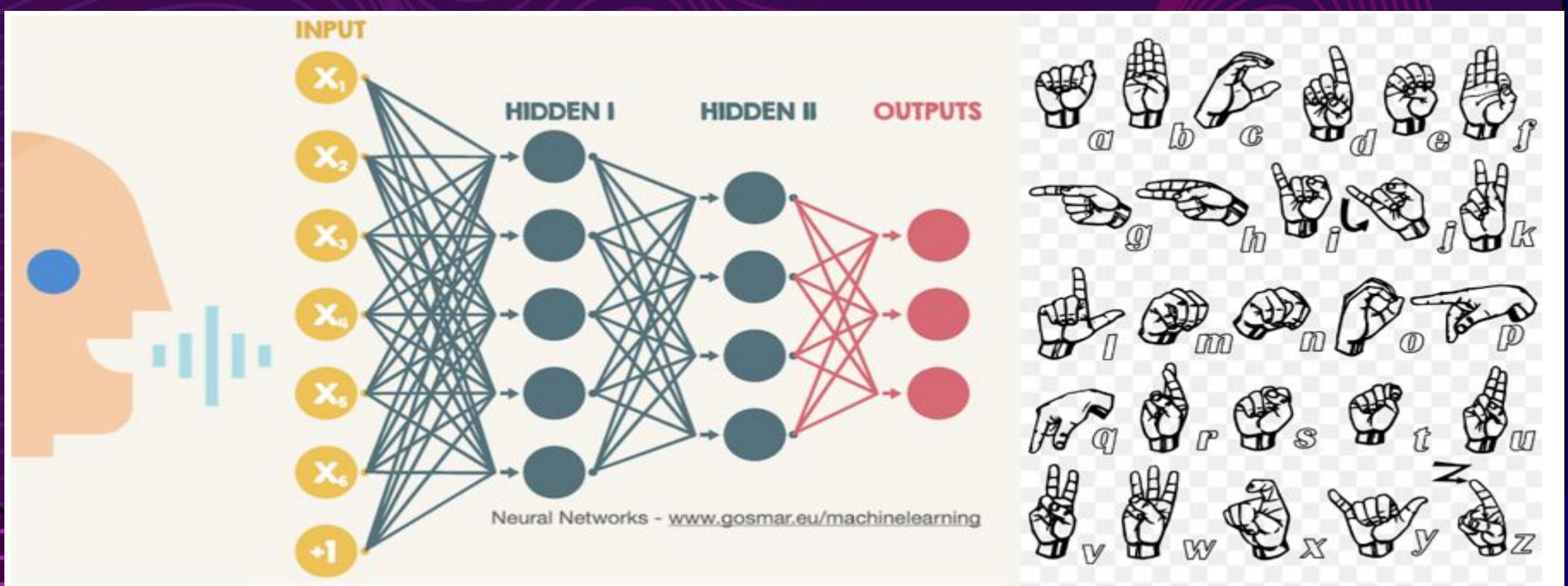
Problem Statement - Design a natural language processing (NLP) solution aimed at converting spoken language into sign language for individuals with hearing impairments. The system should operate in real time and apply to diverse linguistic contexts. Participants must consider the nuances of sign language translation and strive for both accuracy and speed in the conversion process.

Solution

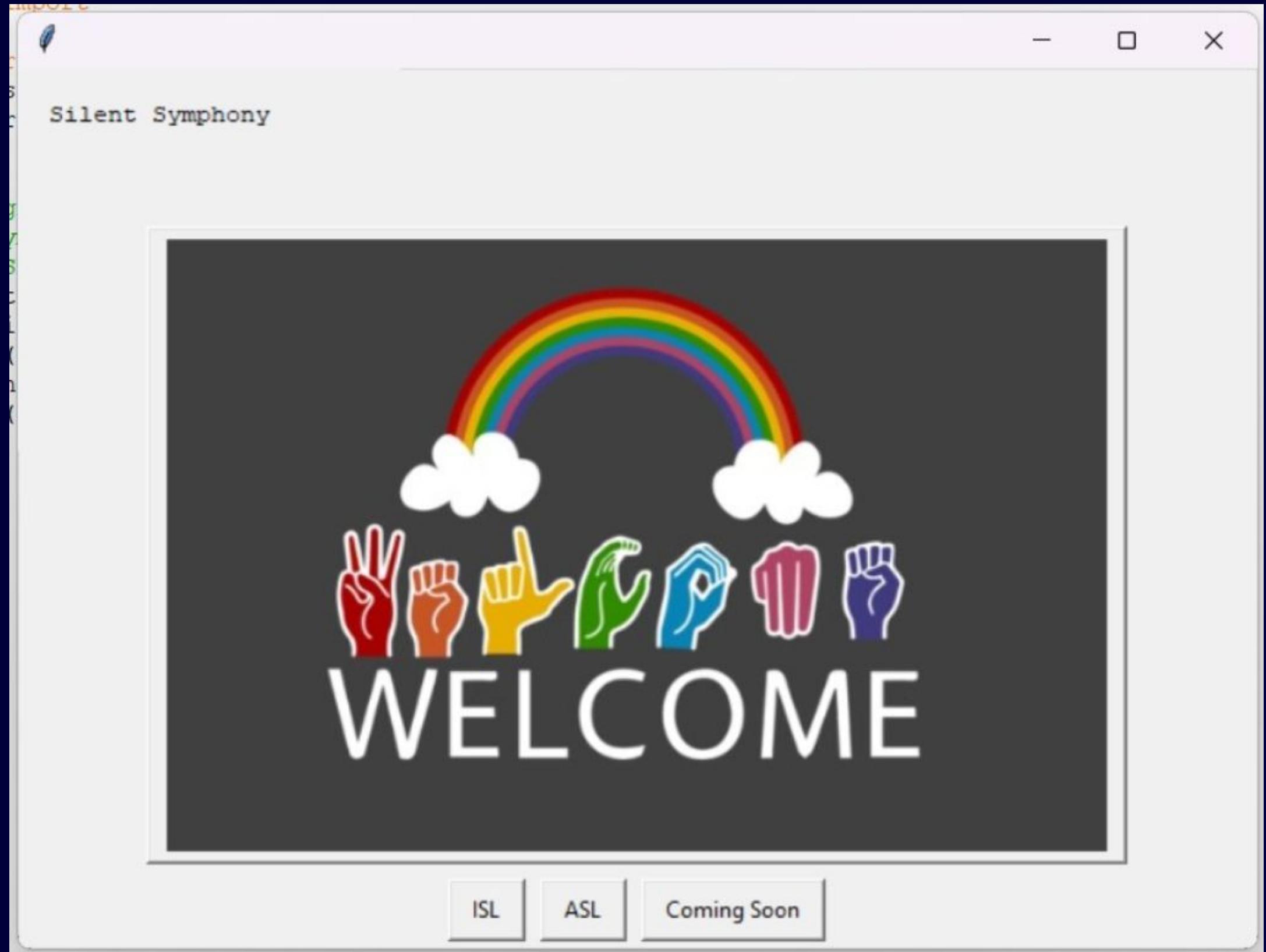
We have developed a software called “Silent Symphony” to bridge the gap in communication with the hard of hearing.

ABSTRACT

This project proposes a Natural Language Processing (NLP) solution tailored to address the communication barriers faced by individuals with hearing impairments by converting spoken language into sign language in real-time. The proposed system leverages advanced NLP techniques to translation across diverse linguistic contexts. Initially, speech input is captured through a microphone and converted into electrical energy, which is further digitized(converted to 0s and 1s) using an analog-to-digital converter in the computer. Subsequently, employing algorithms such as Neural Networks or Hidden Markov Models which is found in the SpeechRecognition module in python, the digital data is transformed into textual form, enabling computational analysis and linguistic processing. The Textual data is then mapped on to the corresponding sign language/ Our solution endeavors to achieve efficiency in bridging the gap between spoken and signed communication modalities.



IDEA/PROTOTYPE



Welcome Screen

Speech to sign language conversion can be done in two ways currently, through this software

1. ISL- Indian Sign Language
2. ASL- American Sign Language
3. Coming soon- other sign languages

IDEA/PROTOTYPE

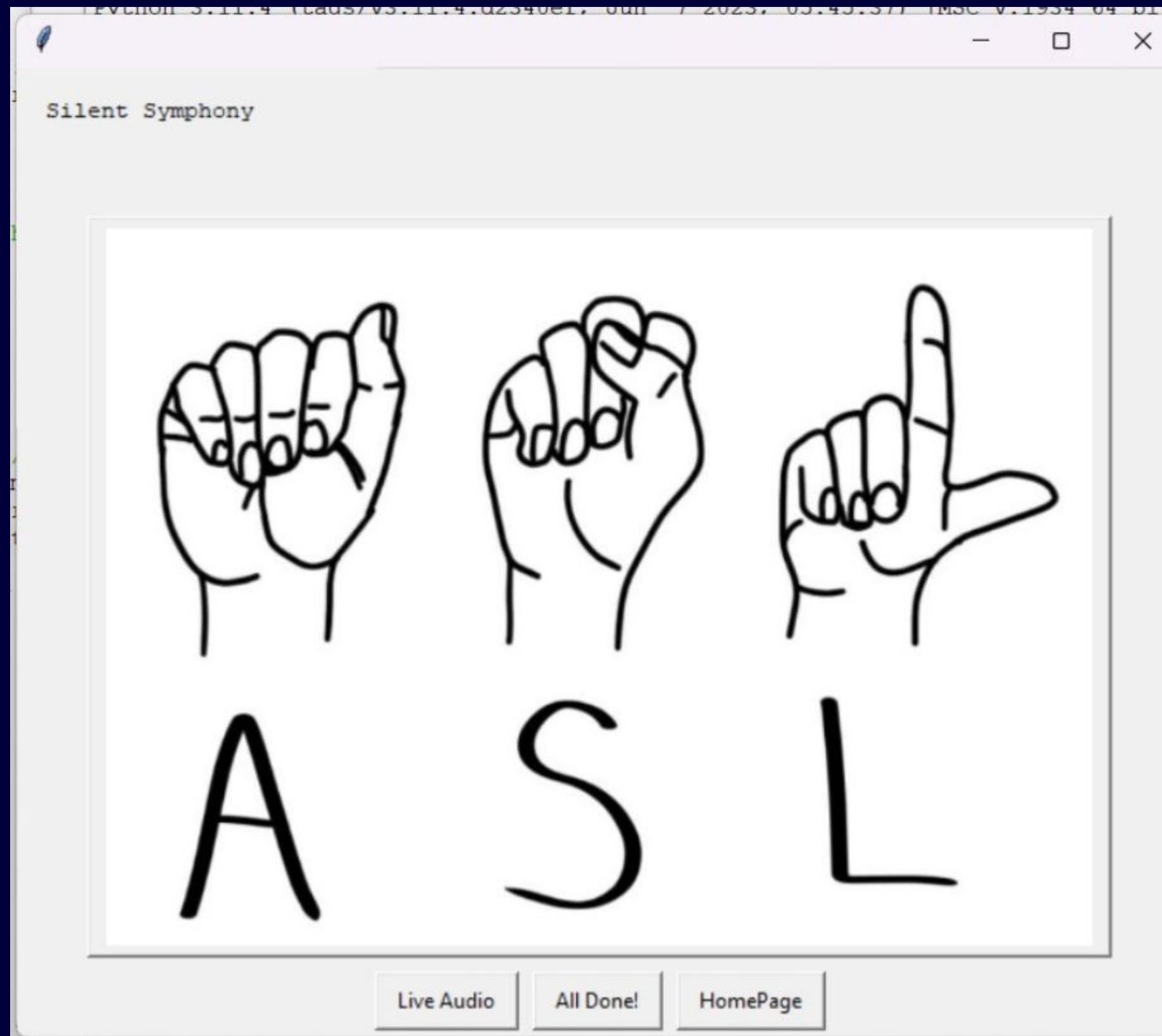


User Interface of speech to ISL conversion

Two options are available

1. Live Audio - to speak and record the audio at the moment and convert it into ISL
2. All Done! - to exit
3. HomePage- to navigate back to the welcome page

IDEA/PROTOTYPE



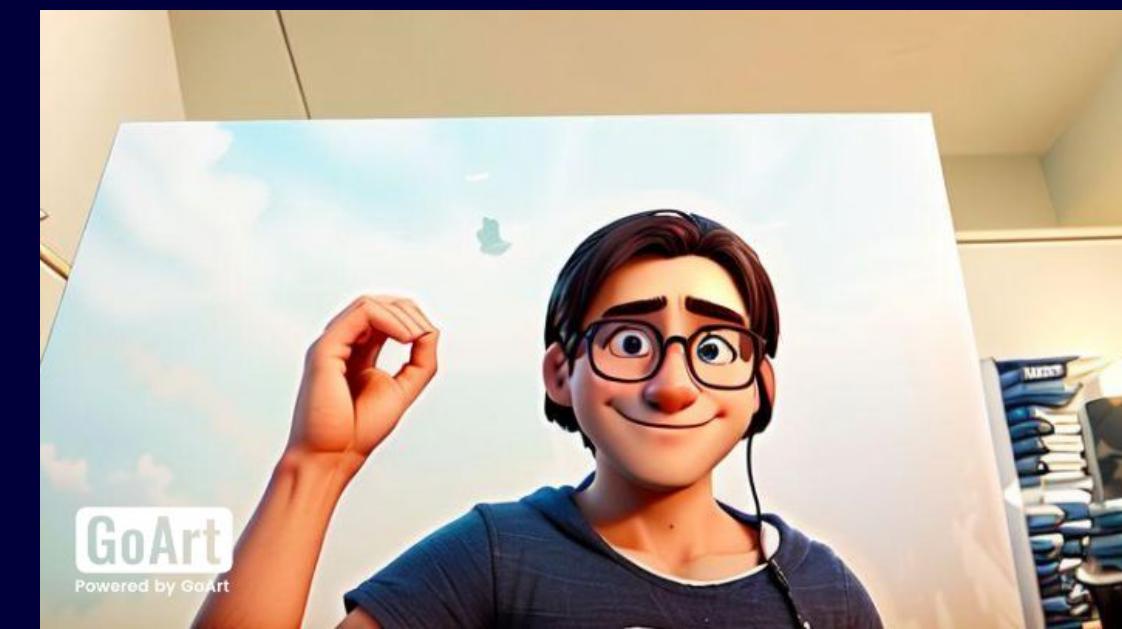
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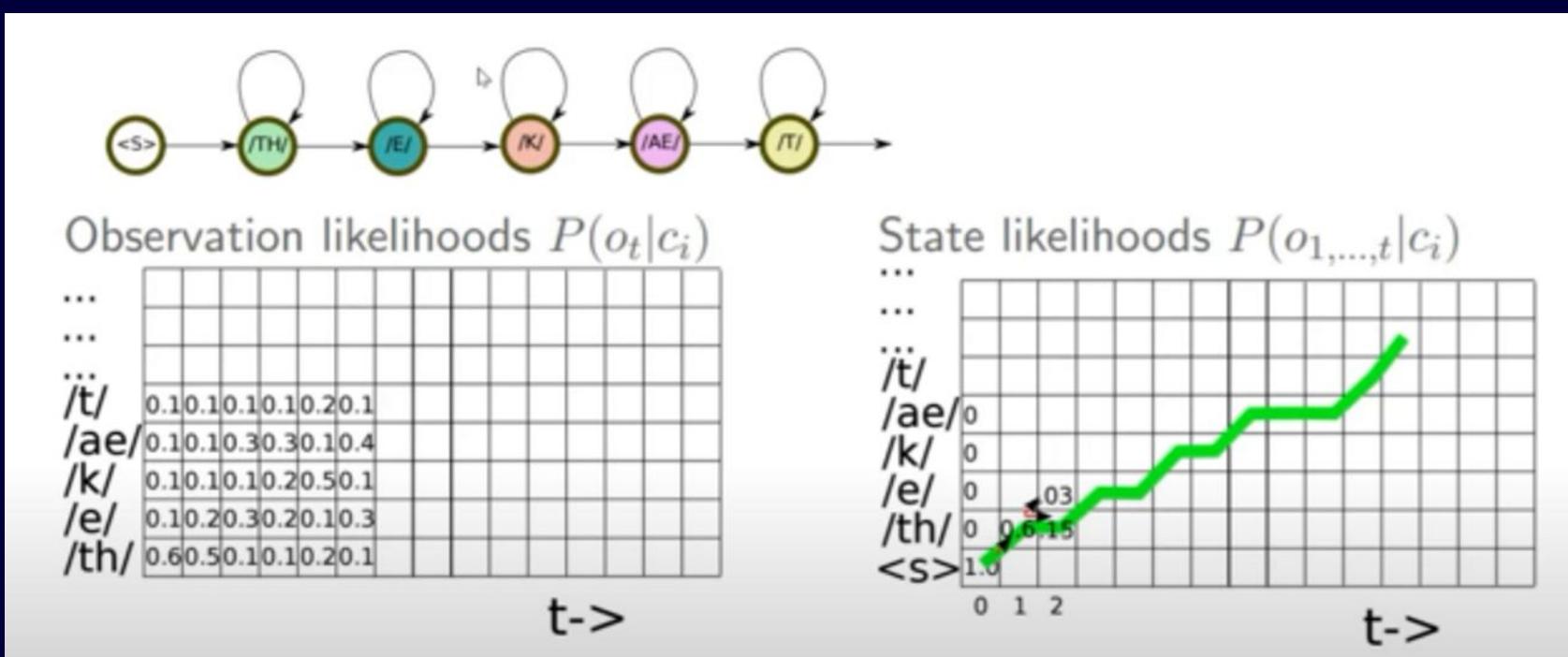
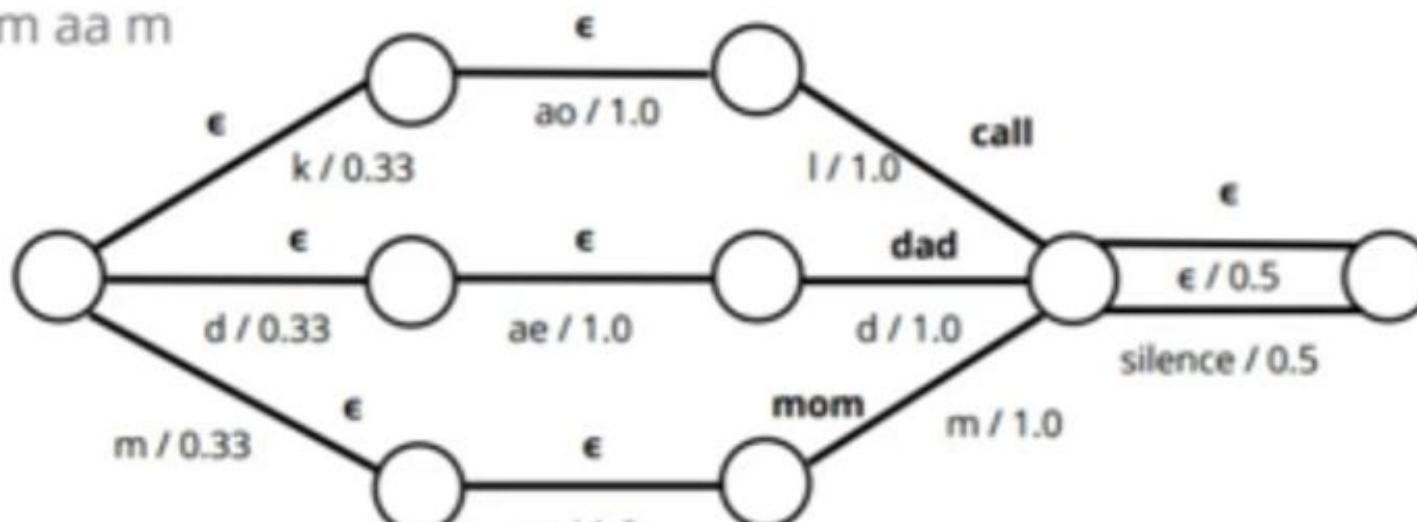
IDEA/PROTOTYPE

Upon choosing the live audio in asl option and speaking “HELLO” we get the output...



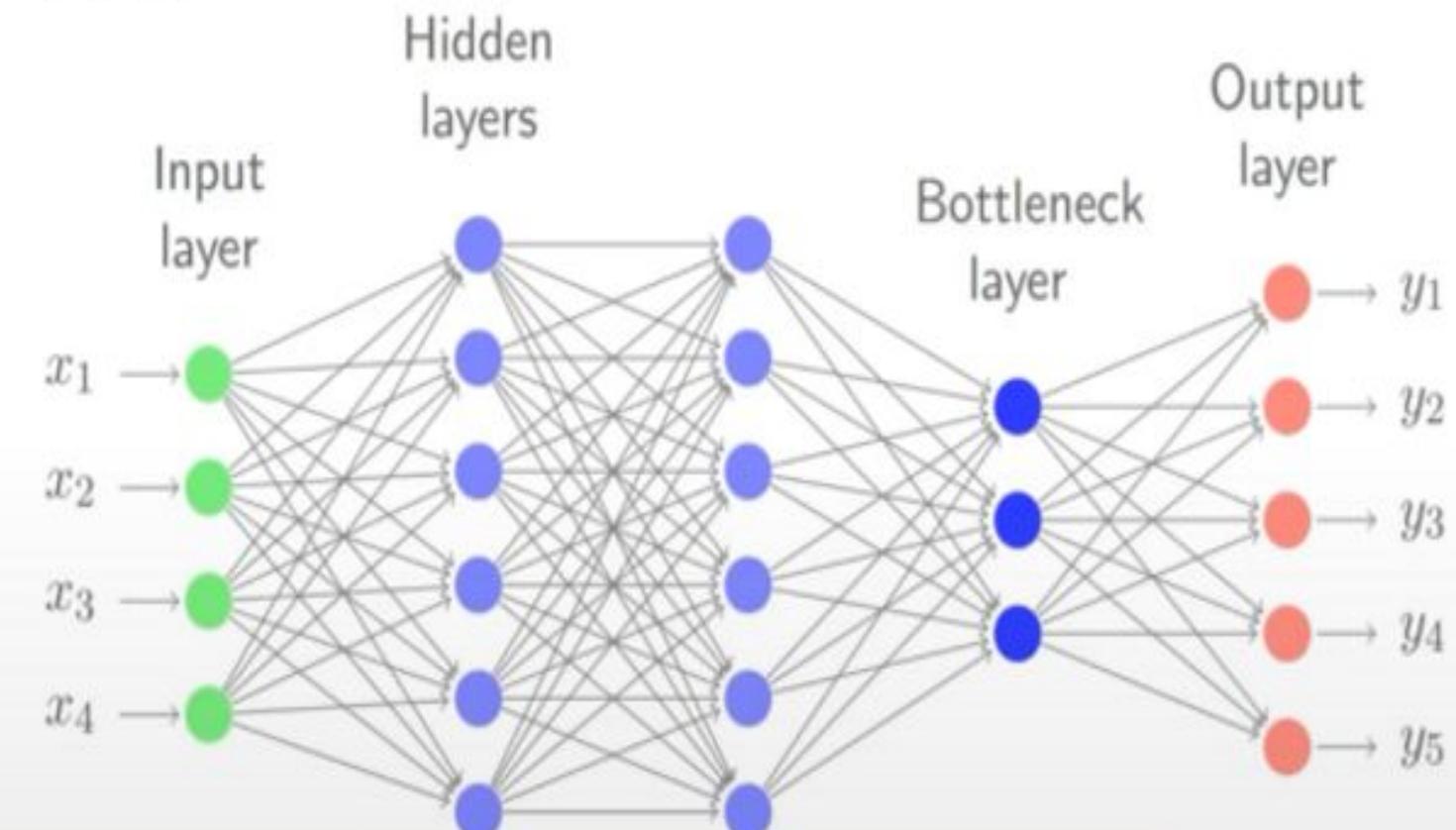
Hidden Markov Model

- call: k ao l
- dad: d ae d
- mom: m aa m



Neural Networks

Use output or a low-dimensional *bottleneck* layer representation as features.



CODE IN PYTHON

The image shows two side-by-side code editors. The left editor contains the 'isl.py' script, and the right editor contains the 'welcome.py' script. Both scripts are written in Python and utilize various libraries.

isl.py - C:\Users\Ananya\OneDrive\Desktop\Hackathon\isl.py (3.11.4)

```
#import selecting
# obtain audio from the microphone
def func():
    r = sr.Recognizer()
    r.energy_threshold=4000
    isl_gif=['good morning','good night','how are you','i am fine']

    arr=['a','b','c','d','e','f','g','h','i','j','k','l','m','n','o','p','q','r',
    's','t','u','v','w','x','y','z']
    with sr.Microphone() as source:

        r.adjust_for_ambient_noise(source)
        i=0
        while True:
            print('Say something')
            audio = r.listen(source,timeout=5)

            try:
                a=r.recognize_google(audio)
                print("you said " + a.lower())

                if(a.lower()=='goodbye'):
                    print("oops!Time To say good bye")
                    break

                elif(a.lower() in isl_gif):
                    class ImageLabel(tk.Label):
                        """a label that displays images, and plays them if they are gifs"""
                    def load(self, im):
                        if isinstance(im, str):
                            im = Image.open(im)
                        self.loc = 0
                        self.frames = []

                    try:
                        for i in count(1):
                            self.frames.append(ImageTk.PhotoImage(im.copy()))
                            im.seek(i)
                    except EOFError:
                        pass

                    try:
```

welcome.py - C:\Users\Ananya\OneDrive\Desktop\Hackathon...

```
File Edit Format Run Options Window Help
import speech_recognition as sr
import numpy as np
import matplotlib.pyplot as plt
import cv2
from easygui import *
import os
from PIL import Image, ImageTk
from itertools import count
import tkinter as tk
import string

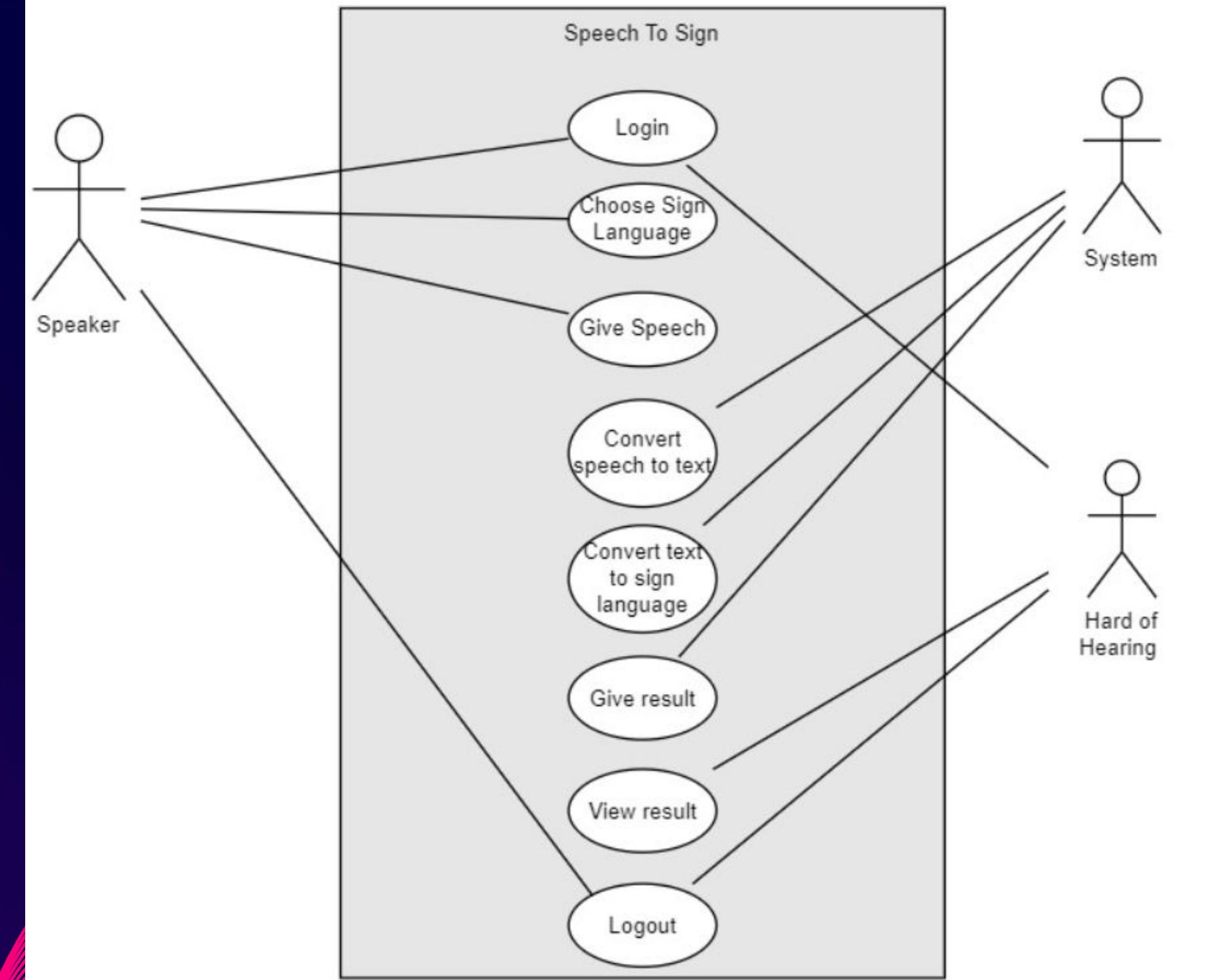
image = "signlanguage.jpg"
msg="Silent Symphony"
choices = ["ISL","ASL","Coming Soon"]
reply = buttonbox(msg,image=image,choices=choices)
if reply==choices[0]:
    os.system("python isl.py")
elif reply==choices[1]:
    os.system("python asl.py")
```

Ln: 27 Col: 58 Ln: 1 Col: 0

TECH STACK



USECASES



DEPENDENCIES AND FEATURES

Dependencies

- Speech Recognition Libraries - The project relies on robust speech recognition libraries or APIs to transcribe spoken language into text accurately.
- Sign Language Dictionaries/Datasets - Access to comprehensive sign language dictionaries or datasets is crucial for mapping text to corresponding sign language gestures accurately.
- Computer Vision/ Graphics Libraries- Libraries like OpenCV or specialized sign language generation tools are needed to generate sign language animations or videos based on the mapped text.

Unique Aspects

- Inclusivity and Accessibility - The project focuses on enhancing communication accessibility for individuals with hearing impairments, addressing a critical need for inclusivity in communication technologies.
- Real- Time Operation - The emphasis on real-time operation sets the project apart, as it aims to provide immediate and seamless translation of spoken language into sign language during live conversations or interactions.
- Empowerment and Community Building - Beyond providing a functional communication tool, the project could aim to empower individuals with hearing impairments and foster community building.

CONCLUSION

"In conclusion, our speech-to-sign language translation technology represents a significant step towards fostering inclusivity and accessibility for individuals with hearing impairments. By bridging communication barriers in real-time, we empower users to engage more fully in education, employment, and social interactions. Together, let's continue leveraging innovation to build a more inclusive society where every voice is heard and valued."

TEAM CONTACT DETAILS

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THANK YOU