Sign Language Interpreter using Random Forest Classifier in Python

Guided by: Dr Pradnya Kulkarni

By:
Sanket Kharche PH-39 1032222219
Vinay Yadav PH-43 1032222389
Nia UK PH-48 1032222721

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Introduction

Problem:

- Deaf community use sign language for communication
- Despite growing awareness, limited sign language understanding leads to communication Barriers
- Deaf community challenges: social interactions, education, employment, and daily life interactions

Our Solution:

- Sign language interpreters bridge the gap between deaf and hearing communities
- Proposing a mini desktop Sign Language interpreter application using Random Forest Classifier
- Creating a Sign Language Interpreter that is robust, simple and takes less time to train a mode

Literature review

Sl. No.	Publication Title	Authors	Year	Positive Aspects	Gaps
1	DeepASL: Enabling ubiquitous and non-intrusive word and sentence-level sign language translation	Fang Biyi	2017	Deep learning for translation	Real-time focus, complex scenarios
2	Facial expression recognition from video sequences: temporal and static modeling	Ira Cohen	2003	Facial expressions as features	Limited to expressions, not hand gestures
3	Sign Language Recognition with Unsupervised Feature Learning	Chen, J.K.	2011	Unsupervised feature learning	Dataset size/variation limitations

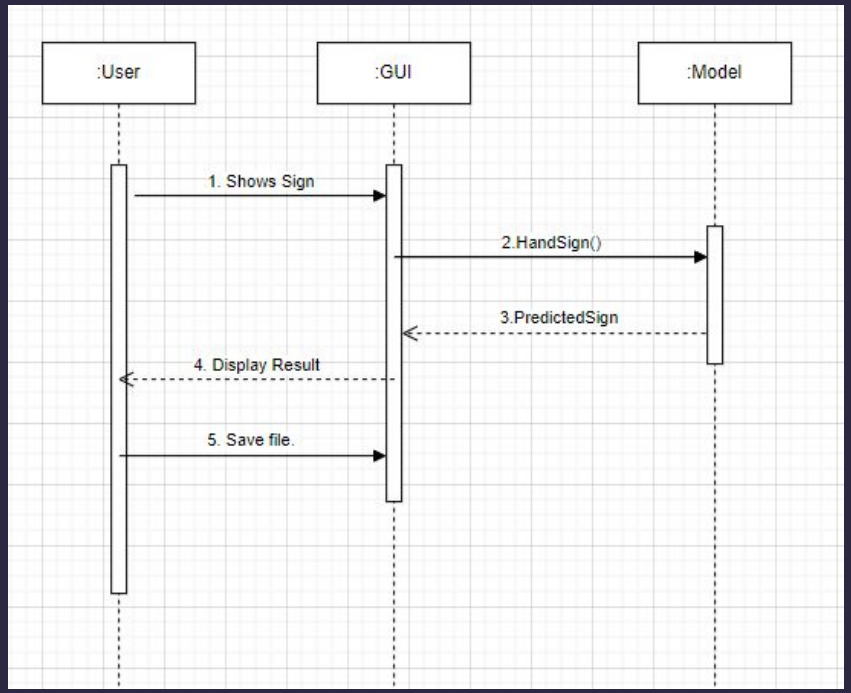
Problem Statement

- Challenge: There's a need for improved communication between people who use sign language and those who don't.
- Developing a Sign Language Interpreter that will recognize sign language gestures and translate them into text
- Target Users:
  >people who use sign language for communication
  >people with hearing impairments not fluent in sign language
  >people from hearing community who want to communicate with the deaf and dumb

Objectives

- Bridge the gap between deaf and hearing community
- Boost Social Inclusion and empower social interactions
- Leverage advantages of AI and Random Forest Classifier models to help the deaf community
- Lay future foundation for further improvements in this domain

SEQUENCE DIAGRAM



PROJECT PLAN

FEB

SRS formation, Dataset Acquisition

FEB-MAR

Implementation: Model Training

MAR

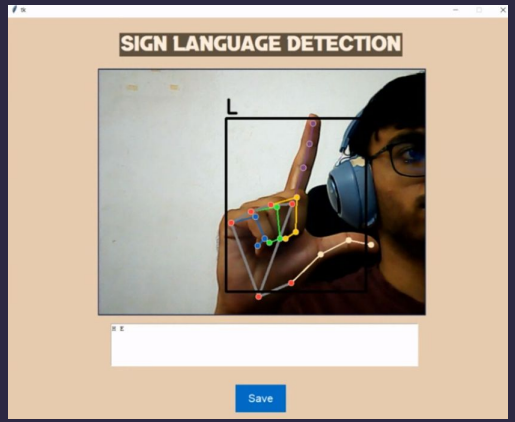
UI Development, Testing

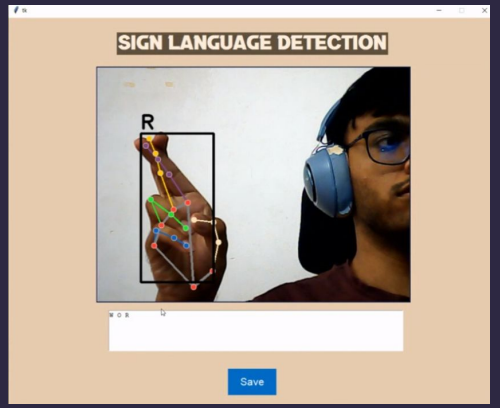
APR

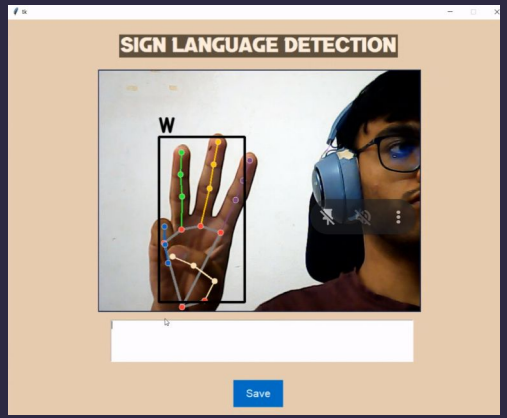
Documentation, Review

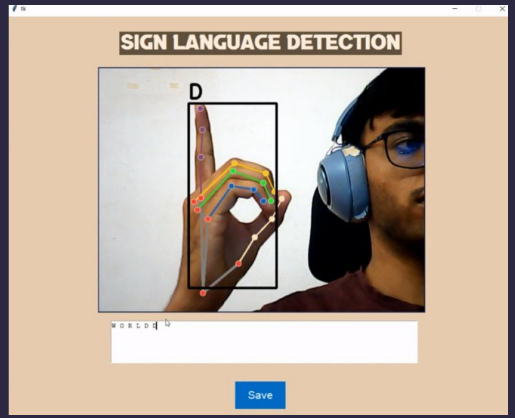
IMPLEMENTATION

Gesturing "**HELLOWORLD**" letter by letter in Sign Language:









IMPLEMENTATION

Exporting interpreted signs to text file

In this case, exporting "**H E L L O W O R L D**" to text file

CONCLUSION

- Developed sign language interpreter app using Random Forest Classifier in Python
- Users can capture Signs via webcam for real time interpretation
- Random Forest Classifier model recognizes signs and displays translated text
- Project showcases Random Forest Classifier potential for real world applications
- Lays base for future improvements in this domain

References

- Sign Language Recognition with Unsupervised Feature Learning (2011) by J.K. Chen
- Real-Time Recognition of Indian Sign Language (2019) by Muthu Mariappan et al.
- https://medium.com/@harshdeepsingh_35448/understanding-random-forests-aa0ccecdbbbb
- https://scikit-learn.org/stable/modules/generated/sklearn.ensemble.RandomForestClassifier.html
- https://www.javatpoint.com/machine-learning-random-forest-algorithm

Thank You