Software Requirements Specification

CHARCHA – STRENGTHENING COMMUNICATION
“Sign language to text conversion”

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1 Introduction

1.1 Purpose

The main purpose of this document is to build a desktop application that uses Artificial Intelligence to convert American Sign Language (ASL) to text, facilitating communication for people that have impaired hearing and/or speech.

1.2 Scope

This document specifies requirements for a simple application for detecting hand signs in real-time and converting it to text.

The package provides users:

- Programs:
    - To click pictures that can be used for Training Custom Model
    - To store pictures on your local machine
    - To convert input pictures to filtered formats using gaussian blur
    - To train and store a Model
- Application:
    - To access webcam and feed input in real-time
    - To detect hand signs and convert them to alphabets
    - To make words using the detected alphabets
    - To build a sentence using the formed words

The package stores pictures in .jpg format that can be accessed and modified.

1.3 Product perspective

1.3.1 System interfaces

The product runs as a Desktop application on both Linux and Windows distribution.

1.3.2 User interfaces

The application’s graphical user interface provides a window with a focus area for gaussian blur filtered input, onscreen prediction of the sign, confirmed alphabets during word formation and history of all formed words in the sentence.

1.3.3 Software interfaces

The application uses Python to write code, OpenCV for image detection and collection, JSON to store the trained model, H5 for storing and loading of model weights, and Command line for executing the application.

1.4 Functional Requirements

- Good quality webcam
- Site packages
- Supported OS Environment
- Python Environment
- Minimum 4 GB RAM

1.5 Non-functional Requirements

- Plain white backgrounds
- Steady hand signs
- Clear view of hands (avoiding heavy or bulky jewellery or accessories)
- Proximity to webcam
- Recommended 8 GB+ RAM
- Sturdy System

1.6 User characteristics (Various Actors)

- Non-Government & Government Organisations
- People with impaired hearing and/or speech
- And practically anyone that would have a need to communicate using ASL!

1.7 Limitations

- Processing and detection time is slow
- Not accessible remotely
- Model needs to be recalibrated using new data for other people

1.8 Assumptions and dependencies

- User has full knowledge of ASL
- User is comfortable with technological interaction
- User has a physical computer system

1.9 Acronyms and abbreviations

Charcha: (English - Discussion) A Marathi word that means the action or process of talking about something in order to reach a decision or to exchange ideas.

2 Detailed Information

- Application recognizes 27 symbols that include all the English alphabets and a blank space.
- Fifty frames of similar detection confirm the prediction obtained for a hand sign
- A blank frame confirms the formation of a word and its addition to a sentence

3 Security

Since, the application does not require internet connection, there is a very less probability of cyber-attacks. The application also does not store any real-time information for protection of user privacy rights.

4 Copyright

The dataset collected and curated for this application is proprietary and cannot be shared with any external parties or clients. Sole ownership belongs to the sponsors and the developers.

5 Supporting information

Usage of this application is subject to the following terms and conditions:

- This application should not be used in a commercial fashion under all circumstances.
- This application should not be used for communication of foul or offensive language
- This application should not be used for communication of information that endangers the privacy, safety, and security of the society.
- The use of this application is not intended to offend or call out the sentiments of any group, person, community, or religion.

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