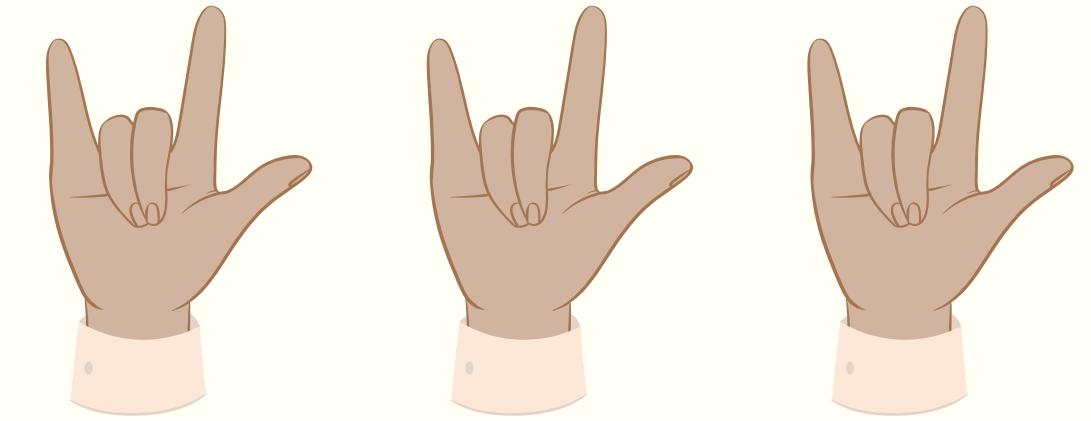
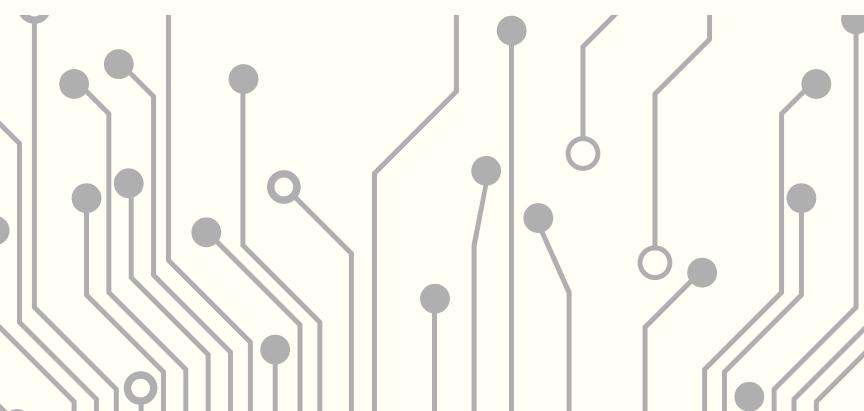




Major Project

SIGN LANGUAGE DETECTION

Project guide:
Mrs. Sandhya
Awasthi



A S L

Submitted by:
Abhishek Sharma
2000320100003

Department of Computer Science and
Engineering ABSEC, Ghaziabad

OUTLINE

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INTRODUCTION

The sign language is used widely by people who are hearing impaired as a medium for communication.

A sign language is nothing but composed of various gestures formed by different shapes of hand, its movements, orientations as well as the facial expressions.

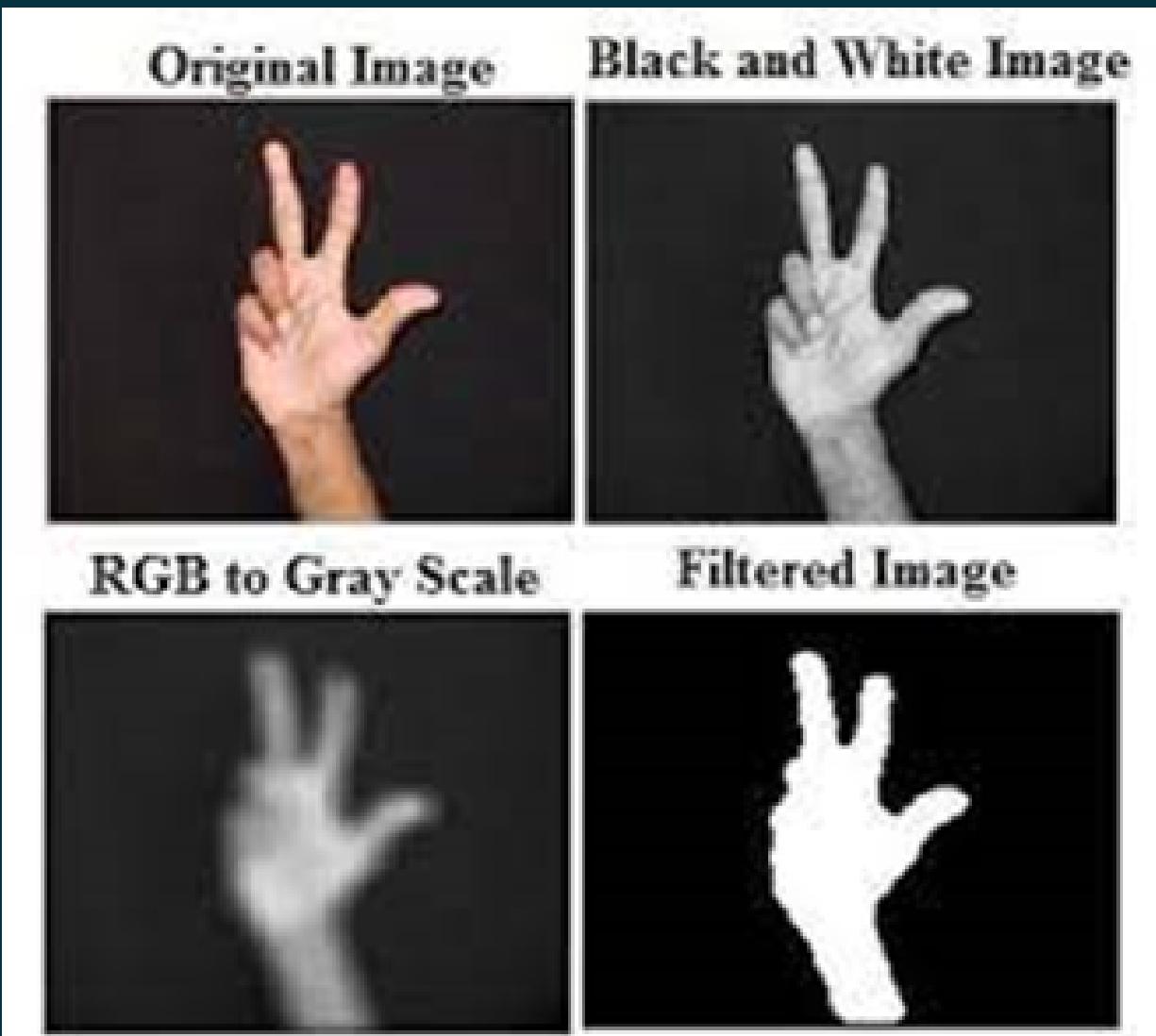
There are around 466 million people worldwide with hearing loss and 34 million of these are children.

► Deaf people have very little or no hearing ability .They use sign language for communication. People use different sign languages in different parts of the world

Unemployment rate among adults with hearing loss are very high in developing countries. Data from Ethnologue states that among deaf population in India, which is about 1% of total population, literacy rate and number of children attending school is very less. It goes on to state that official recognition of sign languages, increasing the availability of interpreters and providing transcription in sign languages greatly improve accessibility. Signs in sign languages are the equivalent of words in spoken languages Signed languages appear to favor.

INTRODUCTION

In this model i have used deep learning (CNN) algorithm which is used to train my model and after training the model it is able to identify different symbols by matching in its database, and the normal english symbol will be displayed to the output window.



PROBLEM STATEMENT

To create a system where communication between every human, be it hearing impaired, vision impaired, or people with no physical disability, is possible. To create a system where sign language is converted into text and speech and vice versa

Literature Survey

Title and author	Publication	Year	Methodology	Limitations
Recognition of Sign Language Symbols using Templates by Deepika Pahuja and Sarika Jain.	IEEE	2020	Non-Parametric Approach for skin color detection, image processing toolbox of MATLAB.	Recognising sign language symbols using static images which make a limited vocabulary.

Literature Survey

Title of paper	Publication	Year	Methodology	Limitations
Sign Language Interpreter System: An alternative system for machine learning by Salma A. Essam El-Din1 and Mohamed A. Abd El-Ghany	IEEE	2020	<ul style="list-style-type: none">• Gloves with sensors.• Uses Arduino for receiving readings.	Cannot detect curves of the fingers properly, hence, prediction is not 100% accurate.

Literature Survey

Title and Author	Publication	Year	Methodology	Limitations
Convolutional Neural Network based Bidirectional Sign Language Translation System by Lance Fernandes, Prathmesh Dalvi and Akash	IEEE	2020	HC-05 Bluetooth module to facilitate wireless communication.	Cannot differentiate '2' from 'v' and '3' from 'w'.

SCOPE OF THE PROJECT

Sign Language Recognition System could be used at reception desks or during video conferences to allow signing people to speak with people who don't know Indian Sign Language. The main point of this project is to use camera to recognize gestures from the Indian Sign Language to offer a new means of communication. The program will be able to transcribe gestures, done by a signing person, into written words, printed on the screen of the person who doesn't know the ISL. Our project converts ISL into text for hearing impaired people

HARDWARE RESOURCES REQUIRED

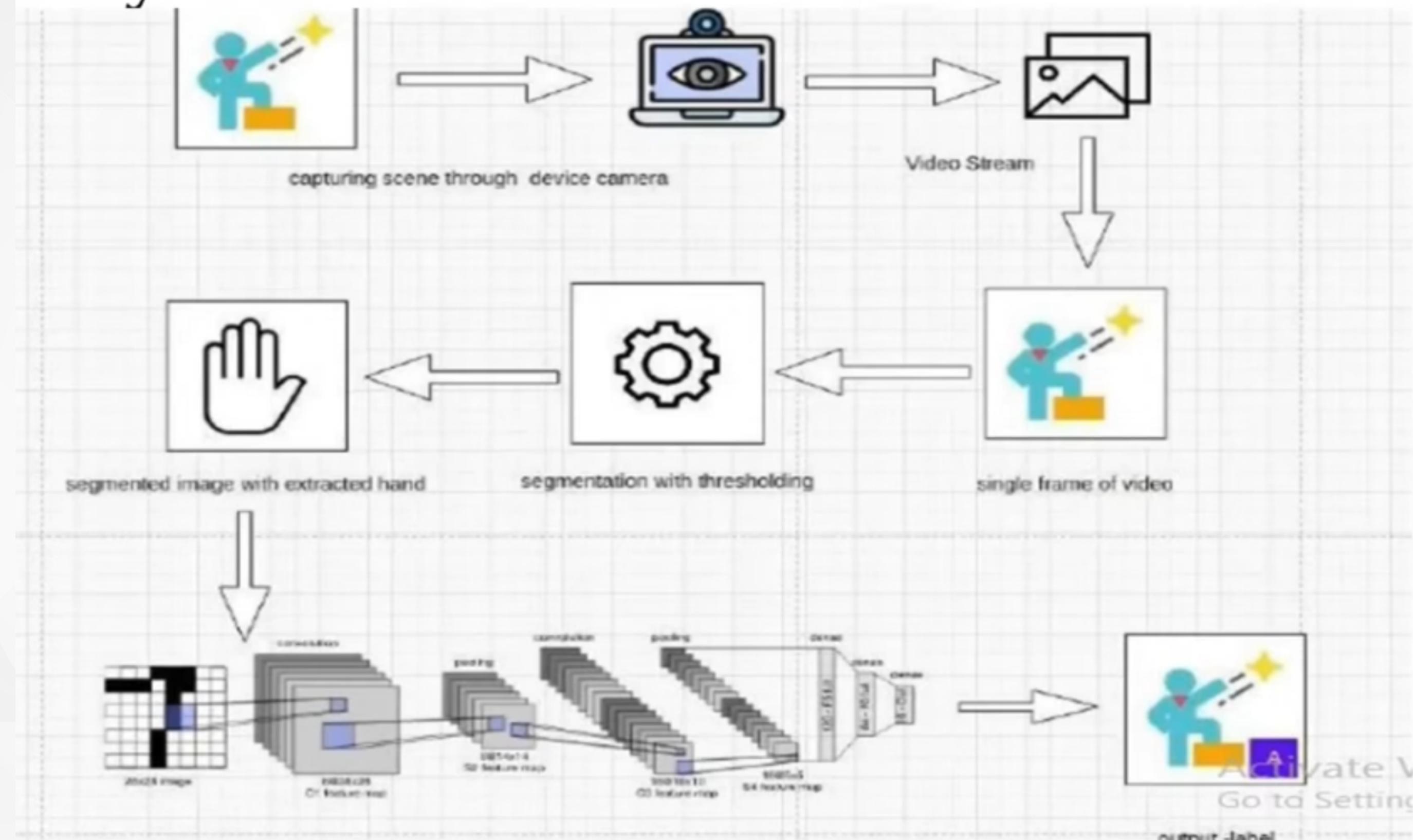
Software Requirements:

- **Operating System:** Windows, macOS, Linux
- **Integrated Development Environment (IDE):** Python IDE (e.g., PyCharm, Jupyter Notebook)
- **Programming Languages:** Python
- **Machine Learning Frameworks:** TensorFlow, PyTorch
- **Computer Vision Libraries:** OpenCV
- **Speech and Audio Processing Libraries:** SpeechRecognition, PyDub
- **Web Development:** HTML, CSS, JavaScript
- **Version Control:** Git

Hardware Requirements:

- **Processor:** Quad-core CPU or higher
- **Memory:** 4GB RAM or more;
- **Camera (for real-time gesture capture):** High-resolution camera with good frame rate
- **Microphone (for audio input):** High-quality microphone for speech recognition
- **Storage:** Sufficient storage for datasets and model training (SSD recommended)

Systems Architecture



Mathematical Model(set theory based)-

- Mathematical model of the proposed system
- Let S be the solution set for the given problem statement,
- $S = \{Input, Process, Output, Success, Failure\}$
where,
 - *Input*→Input to the System
 - *Process*→Process of the System
 - *Output*→Output of the System
 - *Success*→Success cases of the system
 - *Failure*→Failure cases for the System

2) $Process = \{CNN\}$

where,

CNN = Convolutional Neural Network

CNN are deep neural networks used to process data that has a GRID like topology.

3) $Output = \{Prediction, Accuracy\}$

The predicted result will be the output of the system that depends on the input. If the input is sign language, the output will be text or speech and vice versa.

- a) Prediction = model. Predict (test data)
- b) Accuracy = (accuracy score(Y test,Y red)*100)

4) Success

- a) Sign language is converted into text for those who can't understand it.
- b) Text is converted into speech for those who can't read or see.
- c) Speech is converted into text for those who can't write.
- d) Text is converted into sign language for easy communication with the hearing impaired.
- e) Communication is made easy among people who use different modes to converse.

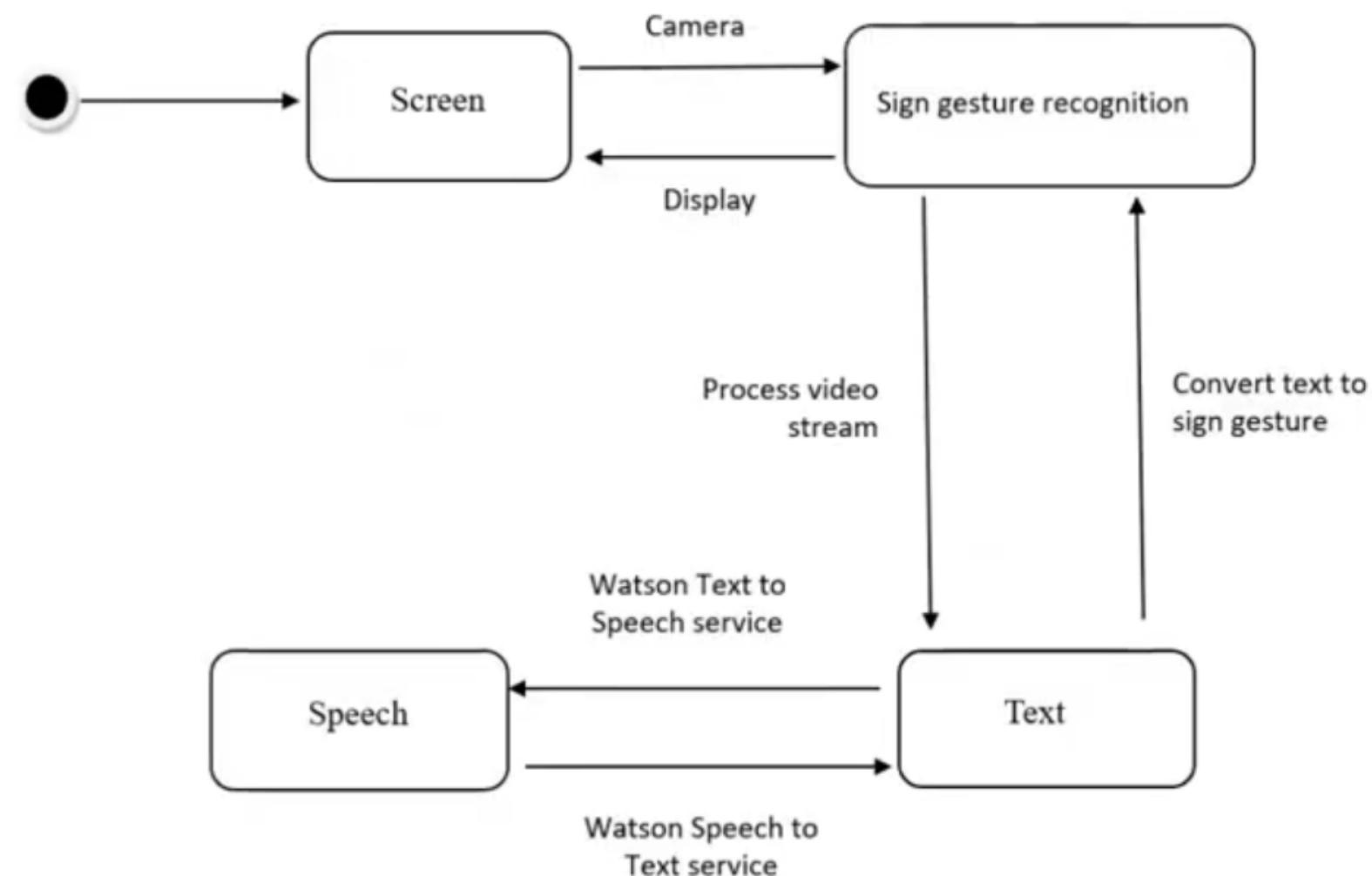
5) Failure

- a) Both the users should be present at the same time.
- b) The system might not know all the signs and may not be able to convert it into text.
- c) The system might not be able to capture the signs accurately if it is blur.

DATA FLOW DIAGRAM

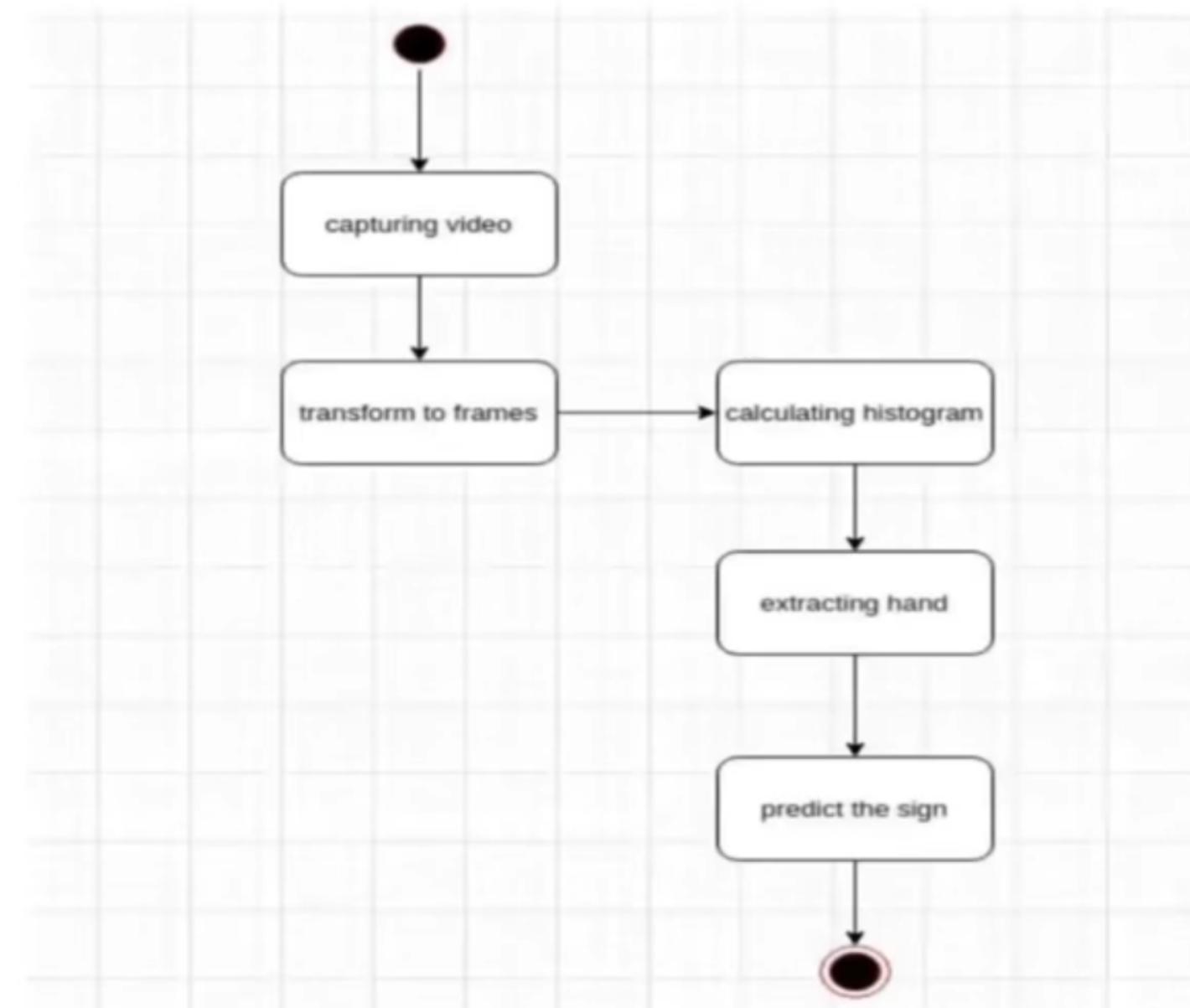
Data Flow Diagram level 1

St

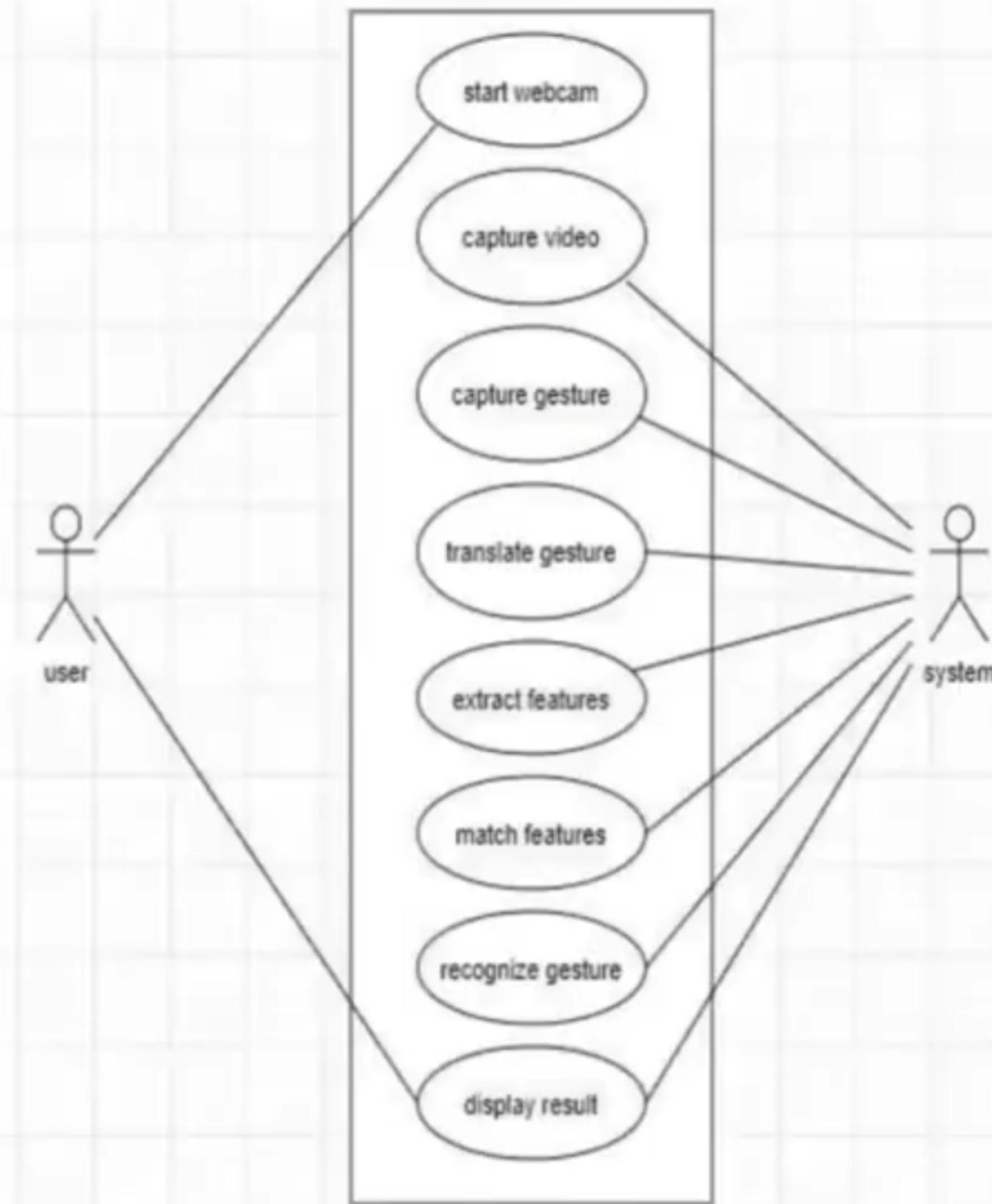


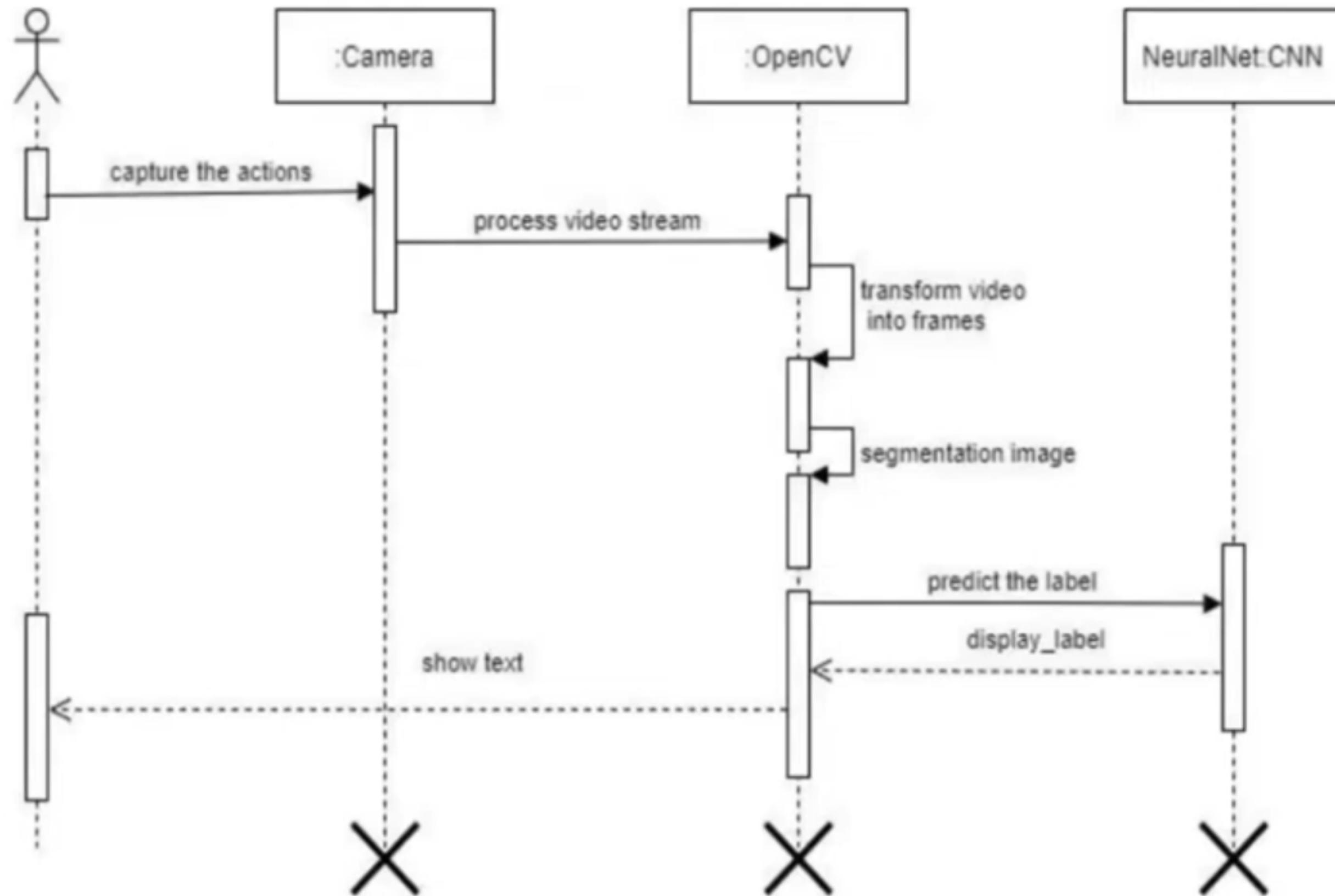
DATA FLOW DIAGRAM

Data Flow Diagram level 0

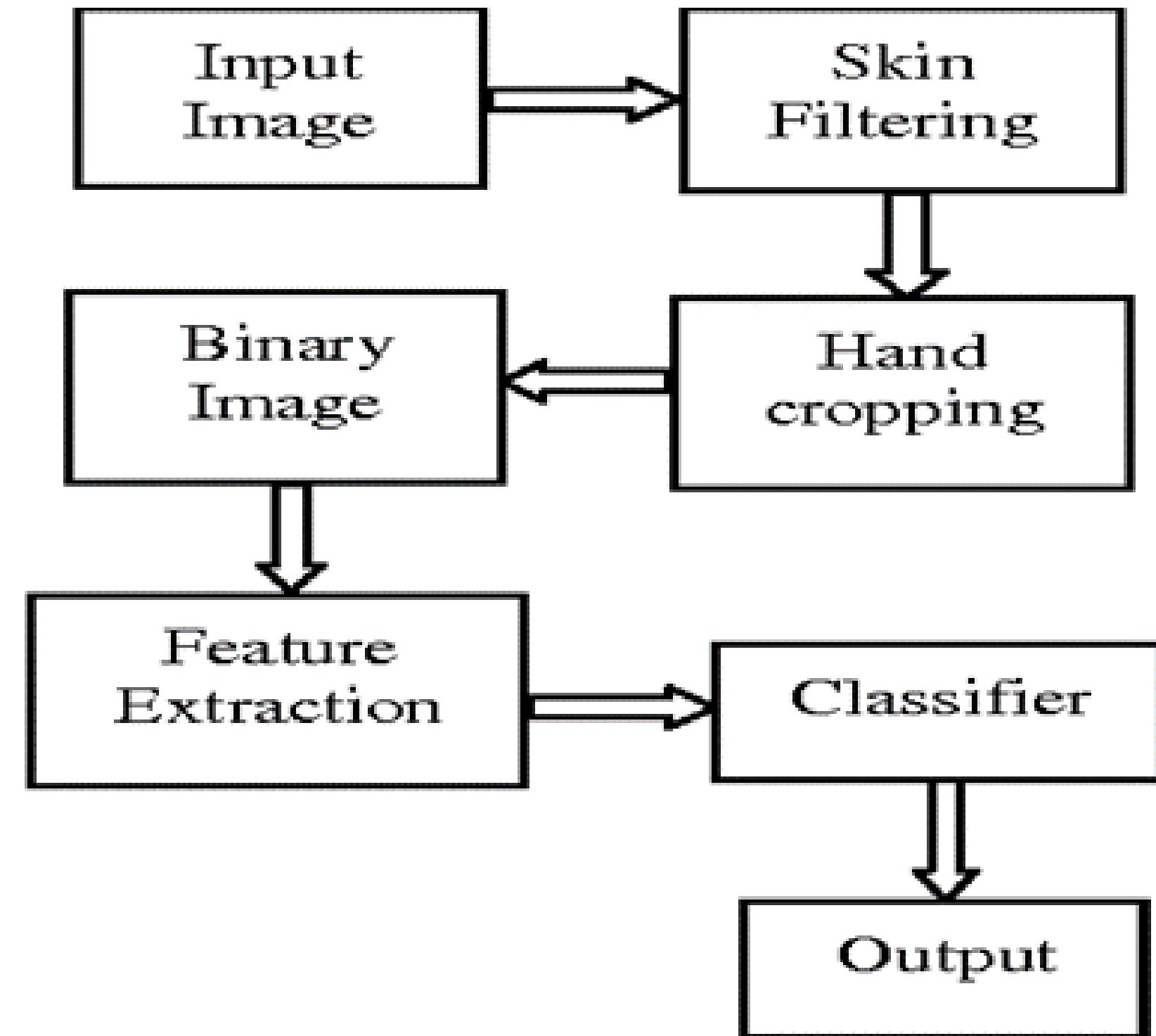


UML Diagram :Use case Diagram





FLOWCHART

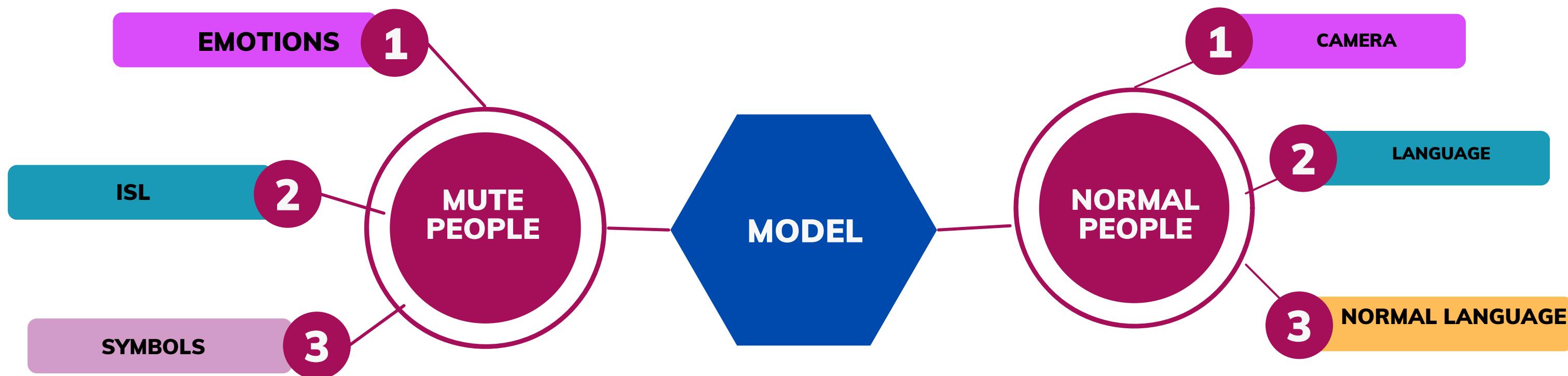


PROJECT ANALYSIS AND DESIGN

Libraries used:

- Numpy
- Keras
- Opencv

IMPLEMENTATION

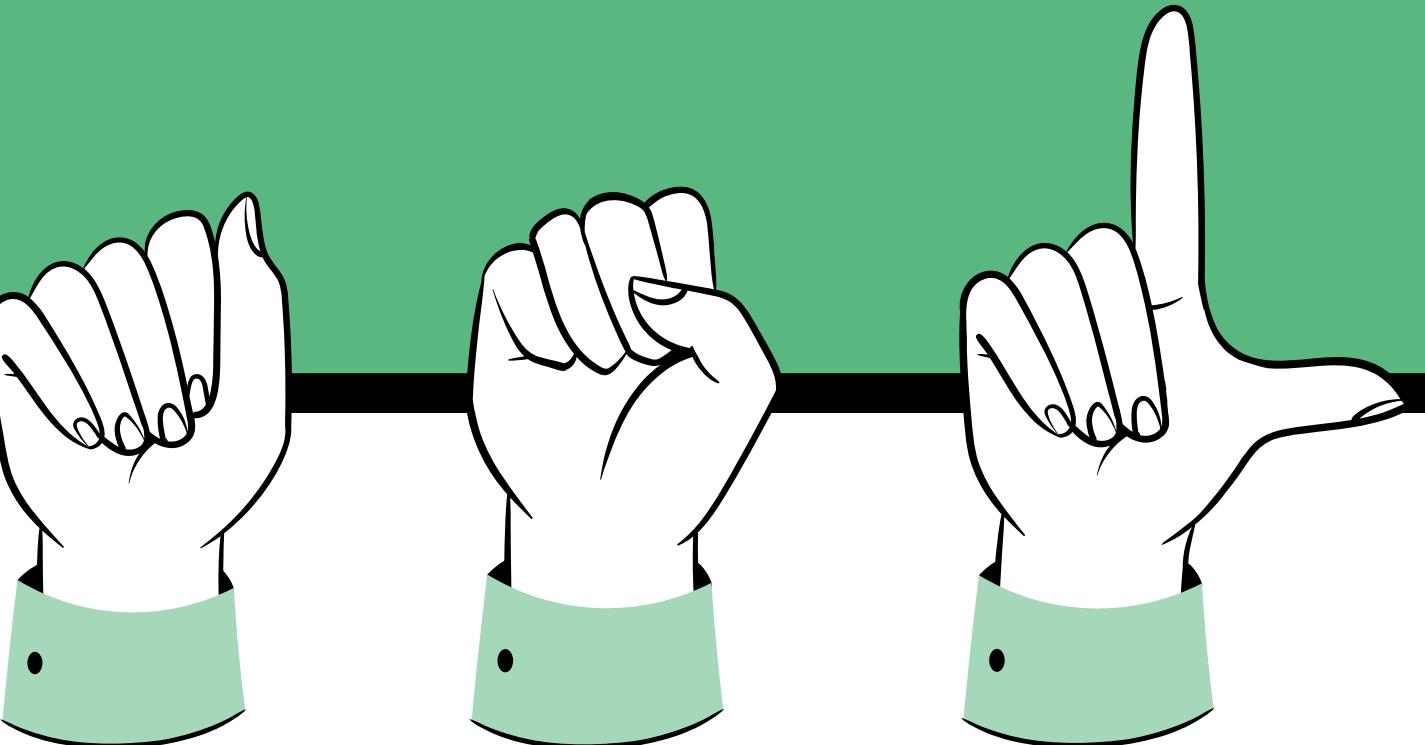


IMPLEMENTATION

- **Data Collection:** Gather a diverse dataset of sign language gestures and expressions.
- **Model Selection:** Choose an appropriate deep learning model (e.g., CNN or RNN).
- **Model Training:** Train the model using the dataset.
- **Real-time Data Capture:** Set up a system to capture real-time sign language gestures.
- **Preprocessing:** Prepare real-time data for input to the model.
- **Model Deployment:** Deploy the trained model on the system.
- **Real-time Inference:** Use the model to recognize sign language gestures in real time.
- **User Interface:** Create a user-friendly interface if needed.
- **Feedback Mechanism:** Implement real-time feedback to users (optional).
- **Testing and Evaluation:** Evaluate system performance.
- **Continuous Improvement:** Collect user feedback and update the model as needed.
- **Accessibility and Integration:** Consider accessibility standards and integration into relevant platforms.
- **Legal and Ethical Considerations:** Ensure compliance with data privacy regulations and consider ethical implications.



STORYED

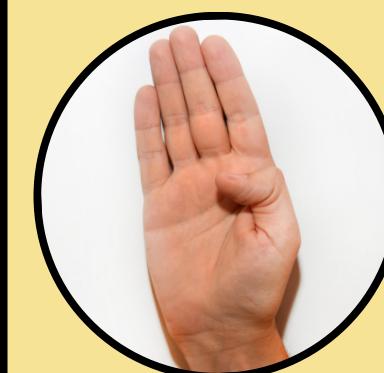


ALPHABET

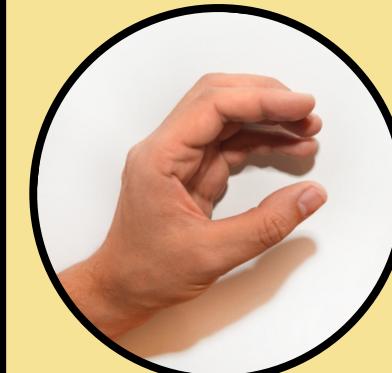
Aa



Bb



Cc



Dd



Ee



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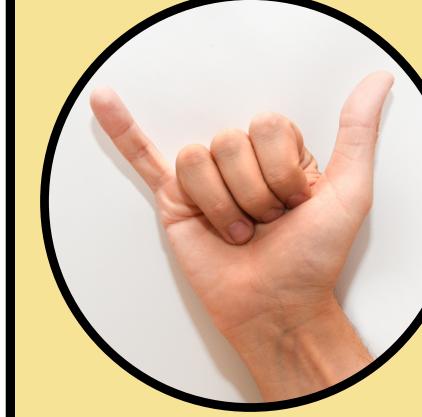
Ww



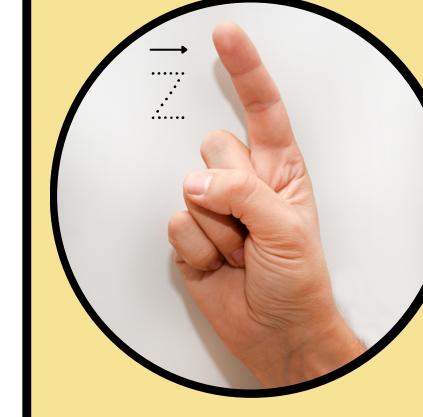
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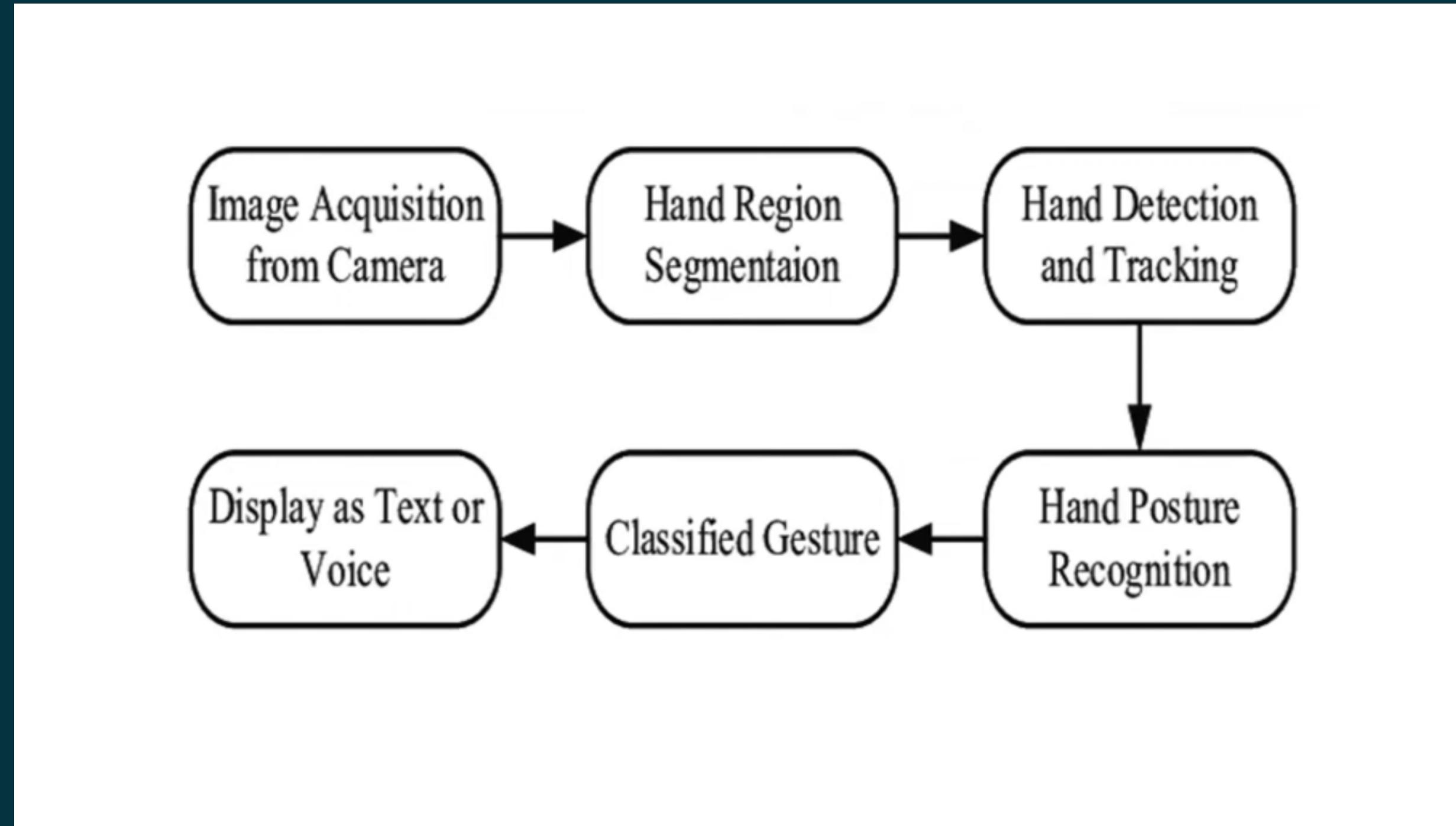
Yy



Zz



METHODOLOGY

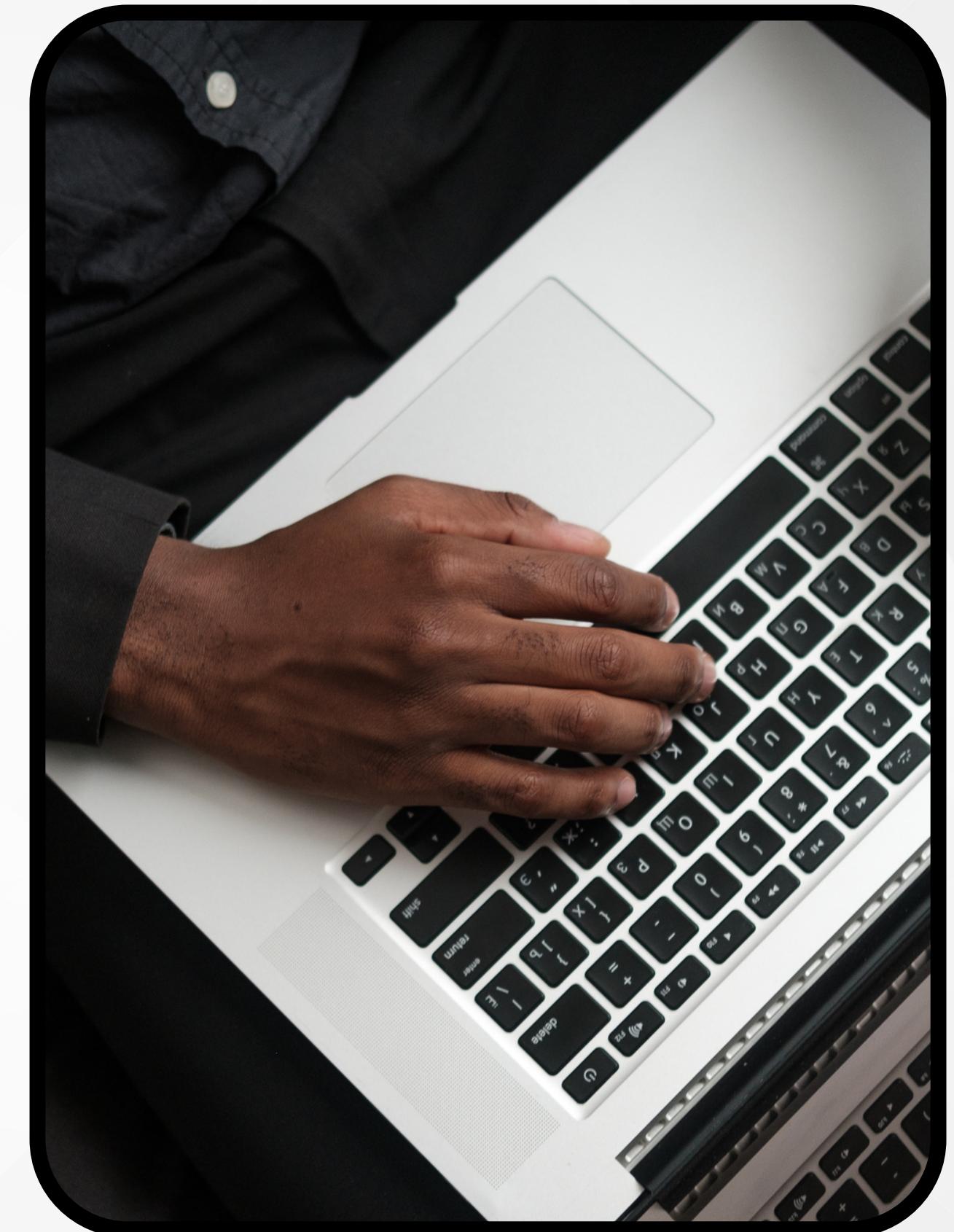


APPLICATIONS

- Our application is used in hospitals, in clinics.
- Our application is also used for interaction at reception desk of hotels, offices etc.

FUTURE SCOPE

- **Improved Accuracy and Performance**
- **Multi-Modal Sensing**
- **Gesture Recognition**
- **Real-Time Feedback**
- **Mobile Applications**
- **Education and Training**
- **Accessibility**
- **Healthcare Integration**
- **Multilingual Support**
- **Gesture-Based Interfaces**
- **Security and Authentication**
- **Data Privacy and Security**



REFERENCES

1. <https://data-flair.training/blogs/sign-language-recognition-python-ml-opencv/>
2. <https://en.wikipedia.org/wiki/OpenCV>
3. <https://www.irjet.net/archives/V9/I4/IRJET-V9I4506.pdf>





**THANK
YOU**