

TEAM: CODERSSPIKE

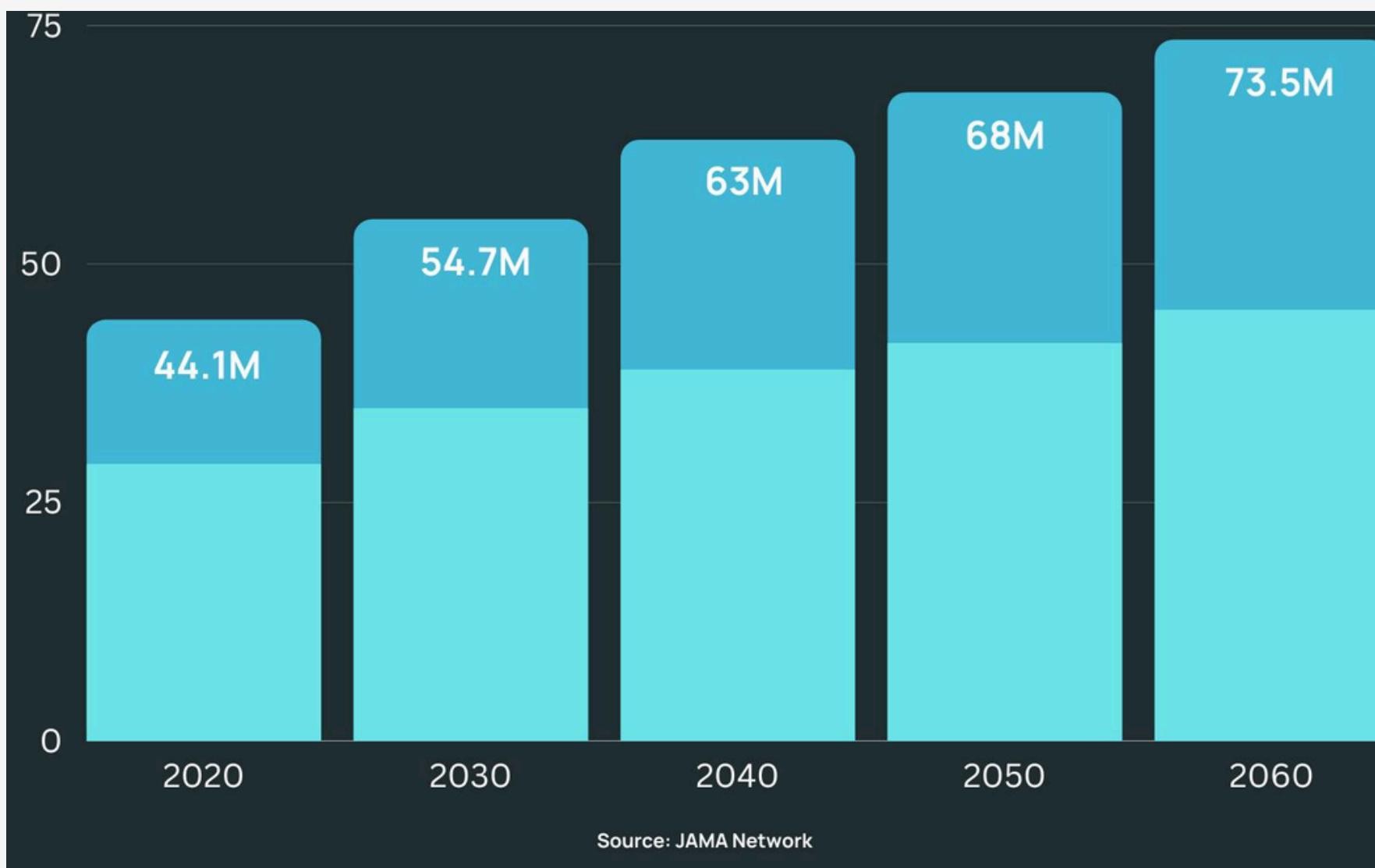
SILENT SYMPHONY: The Sign Language Converter

Connecting Hands, Bridging Worlds: Sign Language Interpreter

by SHAMBHAVI and PREESHA



Mission STATEMENT



The sign language interpreter addresses the challenge of communication barriers faced by individuals who are deaf or hard of hearing. It provides a means for them to effectively communicate with others who may not understand sign language, thus promoting inclusivity and enabling meaningful interactions in various settings.

WORKING VIDEO

WORKING VIDEO

The Potential Social Impact

1. **Communication Barrier:** Eliminates the communication barrier between individuals who use sign language and those who do not understand sign language, enabling seamless interactions.
2. **Inaccessibility of Information:** Provides access to information and services for individuals with hearing impairments who rely on sign language, ensuring they can participate in various aspects of life effectively.
3. **Dependency on Interpreters:** Reduces dependency on interpreters for everyday interactions, empowering individuals with hearing impairments to communicate independently.
4. **Education Accessibility:** Enhances accessibility to education by allowing deaf students to engage actively in classrooms and access educational resources more effectively.
5. **Healthcare Communication:** Improves communication between healthcare providers and patients with hearing impairments, ensuring accurate diagnosis and treatment.
6. **Digital Inclusion:** Promotes digital inclusion by making online content and services accessible to individuals who use sign language.
7. **Social Integration:** Facilitates social integration and inclusion by enabling meaningful interactions between sign language users and the broader community.

Proposed OBJECTIVES

Objective 1

1. Real-time Recognition: Develop algorithms that can accurately recognize and interpret sign language gestures in real-time, minimizing latency between gesture input and translation output.

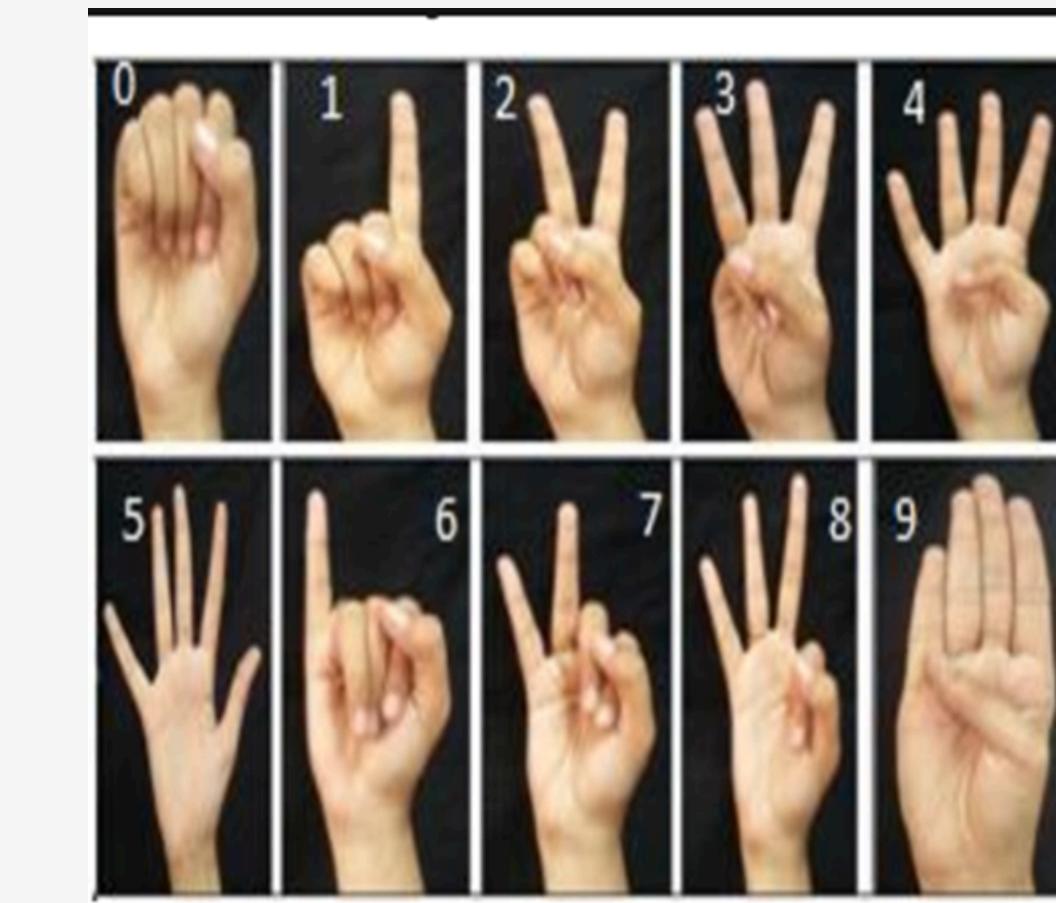
Objective 2

2. Natural Language Generation: Implement algorithms for generating spoken language or text outputs that convey the meaning of the sign language gestures in a clear and contextually appropriate manner.



THE DATA SET

Data set consisting of 26 alphabets of Indian Sign Language and 9 numbers. Data set consists of 1200 images for each character.



P.E.A.S

01 Performance measure:

- Accuracy:** High accuracy in gesture recognition and translation.

- Speed:** Real-time processing and response to ensure smooth communication.

- User Experience:** Intuitive and user-friendly.

02 Environment:

- Indoor Use:** Optimized for controlled indoor environments like offices, schools, or homes.

- Variable Conditions:** Capable of functioning in different lighting and minor background noise conditions.

- Interaction:** Designed to be used in one-on-one or small group interactions.

P.E.A.S

03 Actuators:

- **Visual Display:** To show the translated text.

04 Sensors:

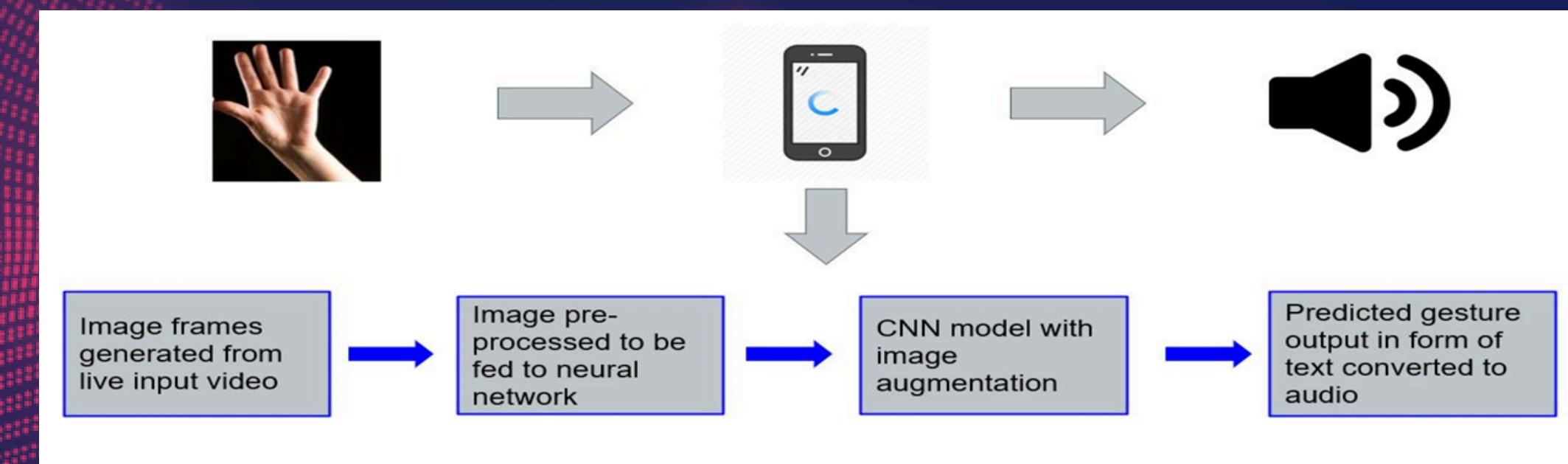
- **Camera:** High-resolution camera for capturing sign language gestures.
- Microphone: For receiving auditory commands or feedback.

HOW IS THE PROBLEM SOLVED?

ALGORITHM USED:

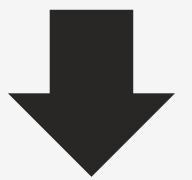
CONVOLUTIONAL NEURAL NETWORK (CNN):

- Used for processing visual input.
- CNNs excel at capturing spatial hierarchies in images, making them ideal for recognizing sign language gestures.
- Training involves a large dataset of sign language gestures



6 CNN LAYERS USED

CAPTURE HAND GESTURE



RGB TO GEYSCALE



GAUSSIAN BLUR (DOWNSIZING)



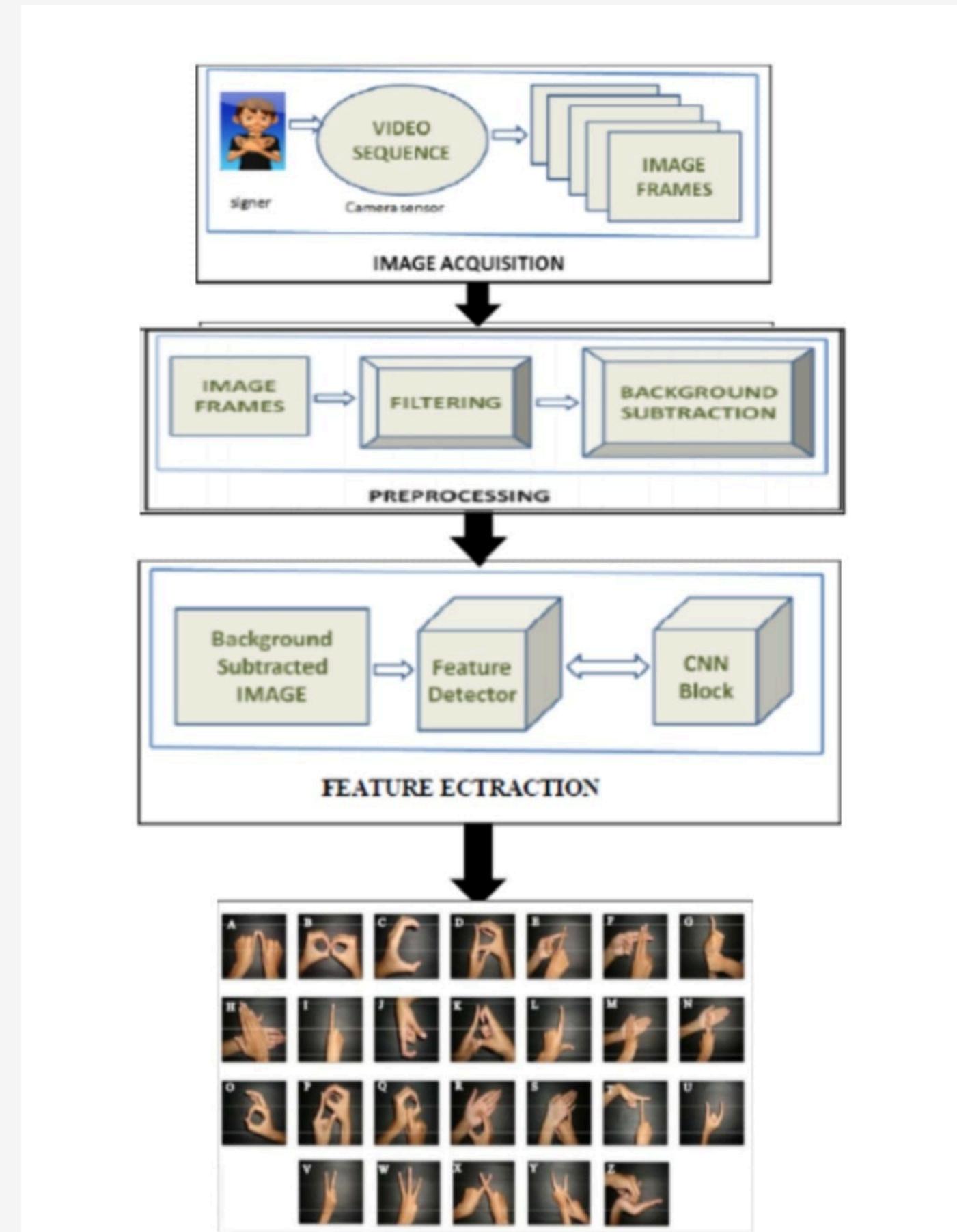
THRESHOLDING

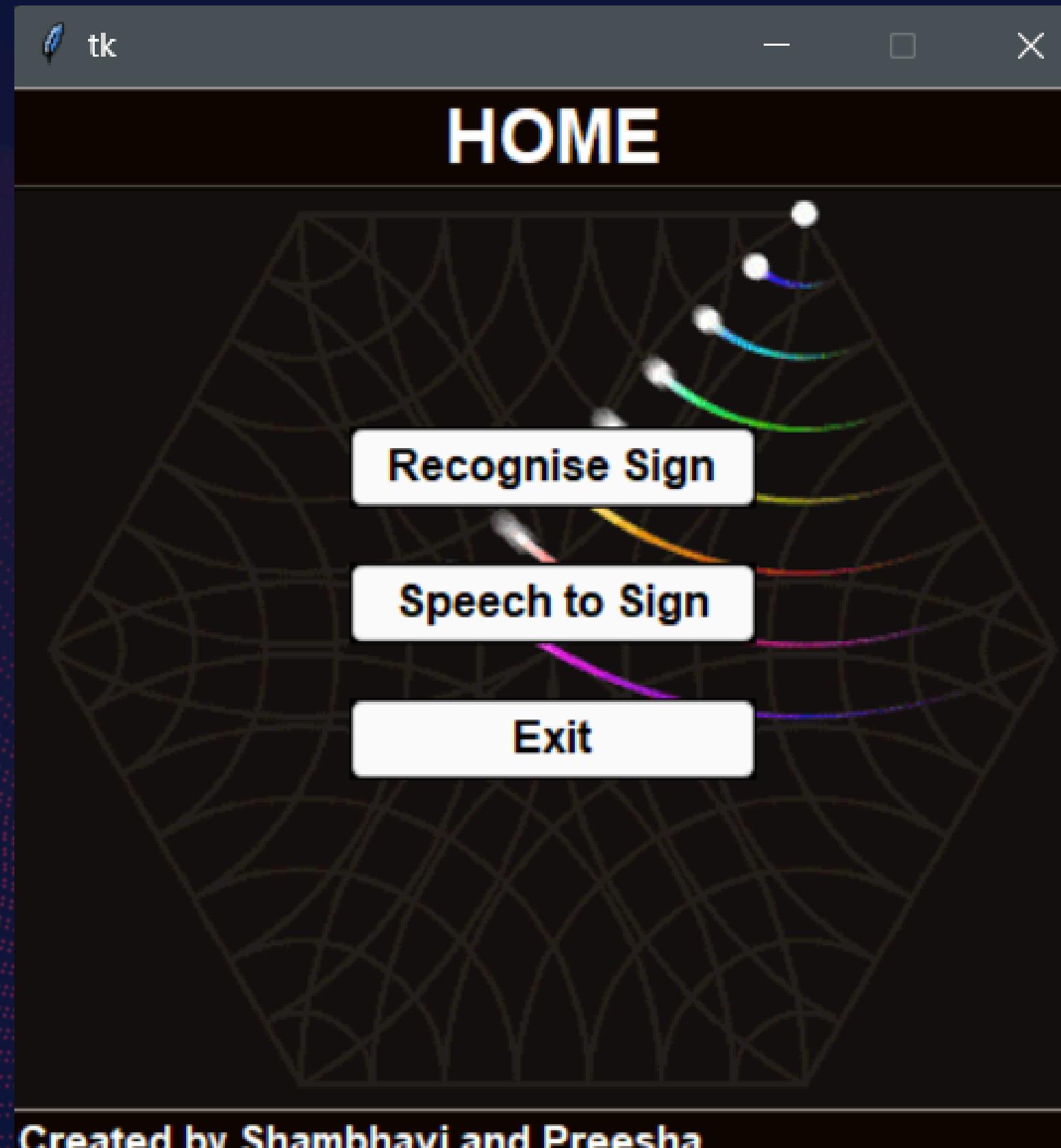


CONTOUR DETECTION



EDGE DETECTION





AGENT INTRO:

- Supervised-Learning based agent.
- Visual and auditory sensors to detect and interpret sign language.
- It uses advanced machine learning models to recognize and translate sign language gestures into text , assisting in real-time communication.

TECH STACK USED

- Implemented using deep learning
- Convolutional Neural Network (CNN)
- Jupyter Notebook
- Gesture Recognition
- Machine Learning
- Natural Language Processing
- Python

Python Libraries USED

- **cv2:** Used for image processing and capturing video from the camera.
- **numpy:** Used for numerical operations on the image data.
- **os:** Used for file and directory operations.
- **pickle:** Used for loading the pre-trained CNN model.
- **pyttsx3:** Used for text-to-speech conversion.
- **tensorflow and keras:** Used for making predictions with the loaded CNN model.
- **threading:** Used for running the text-to-speech functionality in a separate thread.
- **pySpellChecker:** Used for correcting misspelled words in the recognized text.

Future PLANS



- 1. Dataset Expansion Strategy:** Develop an approach to expand the dataset by collaborating with sign language experts and communities to collect diverse and representative samples of sign language gestures. Utilize techniques such as data augmentation and synthetic data generation to supplement the dataset, thereby enhancing the model's robustness and capabilities.
2. Further convert text to speech