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Sign Language Recognition System

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ABSTRACT: Sign language recognition is an important area of research that aims to bridge the communication gap between the hearing and the deaf and dump people.In this paper, we present a sign language recognition system that can recognize and translate hand gesture to the text. Our system is grounded on a Machine literacy approach using convolutional neural networks(CNNs). In order topre-process the input images, we perform image segmentation to insulate the hand region and homogenize the image size. The CNN model is also trained on thepre-processed data and estimated on a test set to measure its performance. For the system perpetration we're using the OpenCV, Keras, uuid and Mediapipe libraries in Python, and it can be fluently extended to fete signs from other sign languages.

KEYWORDS: CNN (Convolutional Neural Networks), Machine Learning, Sign Language, Communication

I. INTRODUCTION

Communication is very crucial to human beings, as it enables us to express ourselves. We communicate through speech, gestures, body language, reading, writing, or through visual aids, speech being one of the most commonly used among them. However, unfortunately, for the speaking and hearing-impaired minority. there is a communication gap. Visual aids, or an interpreter, are used for communicating with them. However, these methods are rather cumbersome and expensive, and can't be used in an emergency. Sign Language chiefly uses manual communication to convey meaning. This involves simultaneously combining hand shapes, orientations, and movement of the hands, arms, or body to express the speaker's thoughts. Sign Language consists of fingerspelling, which spells out words character by character, and word level association which involves hand gestures that convey the word's meaning. Sign language is a visual language that is used by deaf and hard-of-hearing individuals to communicate with each other. Despite the widespread use of sign languages, there is still a communication gap between the hearing and hearing-impaired communities. To bridge this gap, sign language recognition systems have been developed that can recognize and translate sign languages into written text or speech.

II. LITERATURE SURVEY

1. **Real Time Detection and Recognition of Indian and American Sign Language Using Sift In [4]:** Author proposed a real time vision-based system for hand gesture recognition, for human computer interaction in many applications. The system can recognize 35 different hand gestures given by Indian and American Sign Language or ISL and ASL at faster rate with virtuous accuracy. Red Green Blue (RGB)-to-GRAY segmentation technique was used to minimize the chances of false detection. Authors proposed a method of improvised Scale Invariant Feature Transform (SIFT) and same was used to extract features. The system is model using MATLAB. To design and efficient user-friendly hand gesture recognition system, a GUI model has been implemented.

2. **A Review on Feature Extraction for Indian and American Sign Language in [5]**: Paper presented the recent research and development of sign language based on manual communication and body language. Sign language recognition system typically elaborate three steps pre-processing, feature extraction, Classification and. methods used for recognition are Neural Network (NN), Support Vector Machine (SVM), Hidden Markov Models (HMM), Scale Invariant Feature Transform (SIFT).

III. PROPOSED SYSTEM

We present a sign language recognition system that is based on a CNN architecture. Our system is trained on a large dataset. The input to the system is a image of a sign, which is pre-processed to isolate the hand region and normalize

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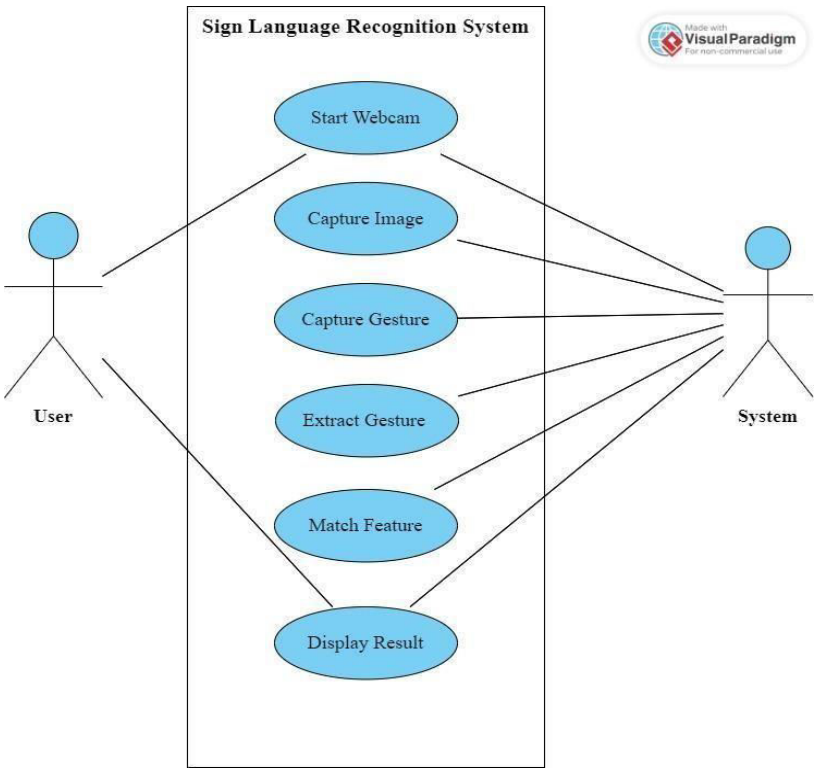
the image size. The CNN is then trained on the pre-processed data and evaluated on a test set to measure its performance. The below flow diagram best describes the workflow of the proposed system.



1. **Start Webcam:**
   User first have to start the webcam of the system.

2. **Capture Image**
   The system will capture the image of the sign performed by the user.

3. **Capture Gesture**
   In this step the labeling of the signs is done.

4. **Extract Gesture**
   Here the Convolutional Neural Network algorithm extract the features of the sign.

5. **Match Feature**
   This is the step where captured image is mapped with image stored in dataset.

6. **Display Result**
   Result is displayed here.

IV. RESULT

The proposed system contains of three module first is signup page, login page then the main module that is sign detection as follow:

- **SIGNUPPAGE:**

In Sign Up Page, the user has to fill up the details such as First name, Last name, authorized email, some security questions likey our birth place, petname, favorite movie, etc .Next user has to create strong password and checking the terms and conditions box he/she can signup and access the software.

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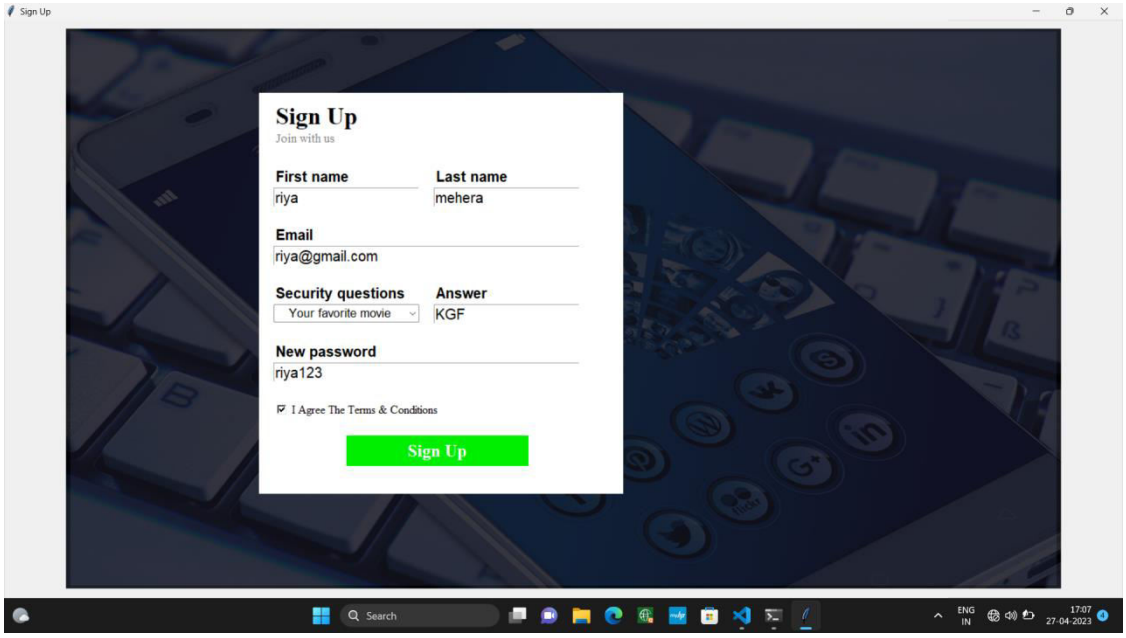

Fig 1: Sign up page

- **LOGIN PAGE:**

Once Signed, user can enter the correct input and directly login. The below still shows the user interface of the login page. In addition, If the user forgets the password, new password can be created

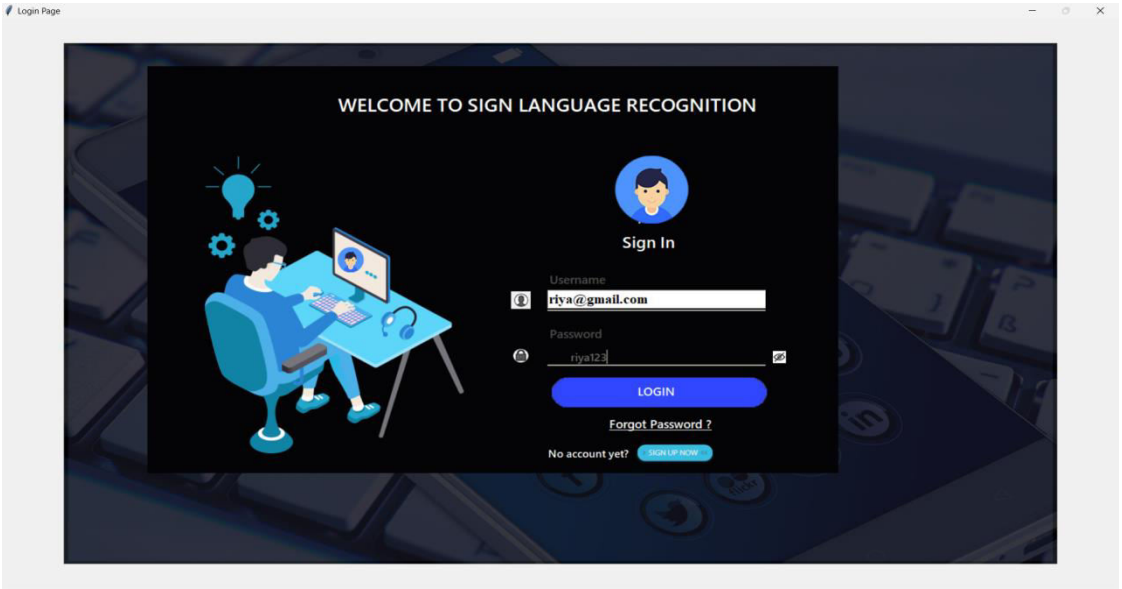

Fig 2: Login page

- **SIGN DETECTION MODULE:**

Here the sign which user can do will detect in our proposed system we are detecting hello, thankyou, yes and iloveyou.

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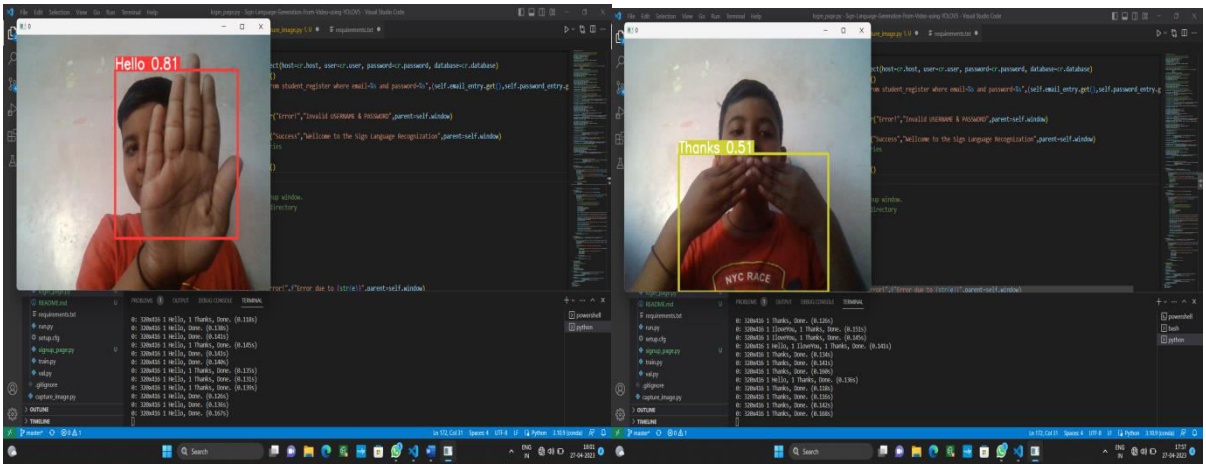

Fig 3: Display of Hello and Thanks

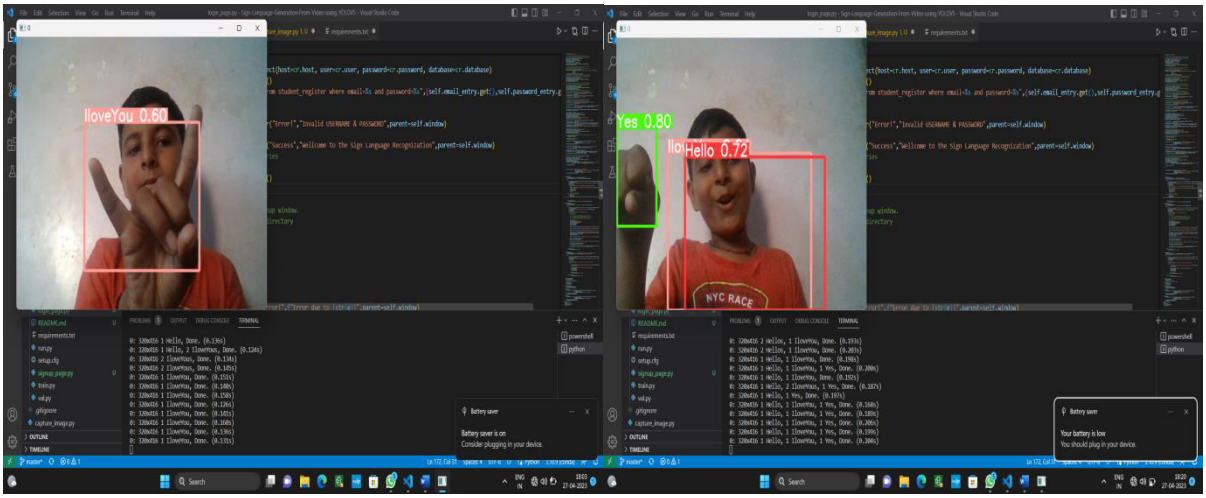

Fig 4: Display of I Love you and yes

V. ADVANTAGES

- **Increased accessibility:** Sign language recognition can provide an alternative means of communication for the deaf and hard-of-hearing communities. This can increase accessibility to information, education, and employment opportunities.
- **Real-time communication:** Machine learning-based sign language recognition systems can facilitate real-time communication between hearing and deaf or hard-of-hearing individuals.
- **Automation:** A sign language recognition system can automate the process of sign language interpretation, reducing the need for human interpreters and increasing the efficiency of communication.
- **Customizability:** Machine learning algorithms can be trained on specific sign languages or dialects, making the system customizable to the needs of different communities.

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- **Scalability:** Sign language recognition systems can be scaled up to reach a large number of users, making it possible to provide access to sign language interpretation in a variety of settings, including education, healthcare, and entertainment.

- **Increased accessibility:** Sign language recognition can provide an alternative means of communication for the deaf and hard-of-hearing communities. This can increase accessibility to information, education, and employment opportunities.

VI. CONCLUSION

we proposed a solution for feasible communication between hearing impaired and normal people with help of Deep learning and Machine learning approach. Sign language recognition system is fully successful one with an accuracy rate at 85% (approximately).

There are still challenges that need to be addressed, such as the recognition of complex gestures, variations in lighting and background, and individual differences in sign language usage. Continued research and development in this area can help overcome these challenges and improve the accuracy and reliability of sign language recognition systems, making them more accessible and useful for people who rely on sign language to communicate.

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