Hand Gesture Recognition System for Deaf and Dumb People

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Abstract: *Deaf and dumb people communicate using language known as Sign language. There are various sign languages but comparing to other sign languages, Indian Sign Language interpretation has got least mindfulness by researchers. Alphabets in English sign language and various phrases can be recognized using the application. It deals with images of bare hands. Hand-Gesture recognition is the ability to recognize hand-gesture. The hand gesture recognition system is solution to this problem which uses the image of hand gesture and recognize the sign present in the image. These features based on gesture analysis of the hand on which image of sign is shown and it extract slant and slope information. System provides an opportunity for deaf and dumb people to communicate with normal people effortlessly. Our research focuses on recognition of English sign language for vast reach of audience. There have been several upgrades in technology and a lot of research has been done to aid the deaf and dumb people. Aiding the cause, Deep learning along with computer vision is being used to make an impact on this cause. It can help the deaf and dumb people in communicating with others as many of us don't know what sign language is. In this sign language recognition project, we create an kotlin application, which detects numbers from 1 to 10 and also the English alphabets. The initial step of this system is to build a database of English Sign Language. Hand gesture detection is the most determining step in each hand gesture recognition system since if we get better segmented output, better recognition rates can be achieved. The proposed system also includes efficient and robust hand segmentation and tracking algorithm to achieve finer recognition rates. Various isolated words from the Standard English sign language have been recognized using a large set of samples. In proposed system, we intend to recognize some very basic elements of sign language and to translate them to text .*

Keywords: Hand-Gesture recognition, Convolutional Neural Network (CNN), Machine Learning, Sign language

I. INTRODUCTION

The goal of Sign Language Recognition (SLR) systems is to deliver an adept and precise way to convert sign language into text or voice for the deaf and dumb people. The android application will be developed usingKotlinwhich is a modern programming language which is widely used in developing Android applications. It is more readable and maintainable language compared to Java, which makes it an excellent choice for implementing machine learning algorithms in hand gesture recognition systems. Keras is an open-source library which is very powerful and has efficient numerical libraries which allows to train our neural network model in least resources.

The challenge of hand gesture recognition scale from the image acquisition to the classification process. Researchers are still finding the best method for the image acquisition. Gathering images using camera gives the difficulties of image pre-processing. Classification methods also give researchers some drawbacks. Wide choice of recognition method makes researchers unable to focus on one best method. Choosing one method to be focused on, tends to make other method that may be better suit for Sign Language Recognition, not being tested.

II. LITERATURE SURVEY

	Title	Authors	Abstract
1	Sign Language Recognition Application Systems for Deaf Mute People: A Review Based on Input Process Output	Ricky Anderson Fanny Wiryana	Develop better Sign Language Application Systems in the future.
2	Real Time Sign Language Recognition and Speech Generation	Amrita Thakur, Pujan Budhathoki, Sarmila Upreti	Sign language recognition system trained by neural network thereby Generating text and speech of the input gesture
3	Sign Language Recognition System	Dhirendra Kumar Choudhary,Rameet Singh	It is wearable devices that can be put on human hands and convert hand's gestures into signs letter by letter and send the data into the firebase for further processing
4	Indian Sign Language Recognition System	Yogeshwar I. Rokade, Prashant M. Jadav	Method is proposed for the automatic recognition of the finger spelling in the Indian sign language.
5	Sign language recognition: state of the art	Ashok Kumar Sahoo, Kiran Kumar Ravulakollu, Gouri Sankar Mishra	Computer recognition of sign language deals from sign gesture acquisition and continues till Text/speech generation.

III. APPROACH

The input device in sign language recognition is camera. The input data is in the form of hand gesture images that can be easily captured by camera. The data is then preprocessed. Signer must be ready to perform sign language hand gesture before clicking the start button in the application and click the Stop button when the signer is done performing the gesture.

Hand Gesture recognition System consists of three basic levels:

- Detection: Using camera, a device detects hand gestures, and the machine learning algorithm segments the image to find hand gesture.
- Tracking: movements of hand are monitored to detect hand gesture to provide accurate input for data analysis.
- Recognition: The system tries to find patterns based on the gathered data. When the system finds the match and interprets a gesture, it performs the action associated with this gesture. Feature extraction and classification in the scheme below implements the recognition functionality.
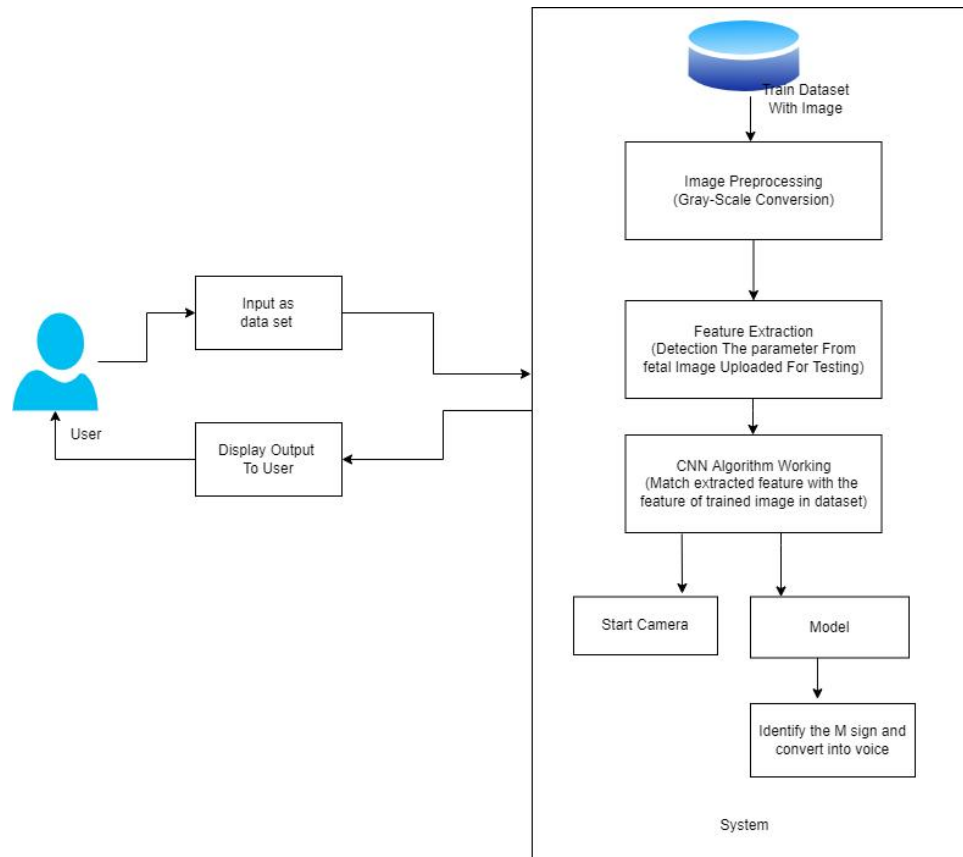
Fig. 1 System Architecture for hand gesture recognition system

IV. FUTURE SCOPE

Hand gesture recognition is a crucial aspect of human-computer interaction, and its applications are found in a wide range of areas, such as gaming, virtual reality, and sign language recognition. In recent years, the development of machine learning algorithms has enabled the development of hand gesture recognition systems with high accuracy. The use of machine learning algorithms has proven to be more efficient and accurate compared to traditional computer vision methods.

V. CONCLUSION

The development of hand gesture recognition system for Android devices has the potential to enhance ways to communicate effectively with deaf and dumb people. In this research paper, we have explored the process of developing an Android application for hand gesture recognition using machine learning techniques. The results of this research shows that it is possible to develop a hand gesture recognition system for Android devices that can accurately recognize hand gestures. The system has various use cases such as controlling media playback, gaming, and virtual reality.

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Impact Factor: 7.301

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