Real-Time Communication System Powered by AI for Specially Abled

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INTRODUCTION

There are many emerging technologies evolve constantly. But these technologies should be helpful for every human kind and living beings in all possible ways, without causing natural ecosystem in trouble. There are few inventions are in use by the help of AI (Artificial Intelligence), like Alexa and Siri. These are virtual voice assistance that helps people to communicate and interact with them. Such systems that can interact with many devices and manipulate according to the user's preference. When it comes to specially able persons, they find difficult in communicating with the people around them. It also a serious condition when these people are in need of help, but they couldn't able to communicate. Some may know read and write in certain languages. Though not every specially able person know all languages to write and communicate. Thus, the sign language came into the picture, but still most people don't know sign languages to understand what those people are trying to convey. With the help of Artificial Intelligence, an application can be built which captures the sign language that the specially able person does and converts to text of what they are saying. This can be understood by the other person and give a response by a text input which then the application displays as a sign language in order to the mute person to understand.

LITERATURE SURVEY:

[1] Researchers are actively investigating methods to develop sign language recognition systems, but they face many challenges during the implementation of such systems which include recognition of hand poses and gestures. This paper focuses on the sign language alphabet recognition system because the letters are the core of any language.

There are two types of sign language recognition methods namely sensor-based and image-based. The first method is dependent on localized sensors or wearing specific gloves. The second method uses different types of cameras. It is based on image processing which does not require equipment such as sensors. Various datasets are created because of many factors such as regional differences, type of images (RGB or Depth) and so on. In this study, an American Sign Language Alphabet (ASLA) dataset is created and developed a deep learning-based method for its recognition.

The creation of the dataset was dependent on many factors such as illumination and the distance between the camera and hand which is adjusted to improve the performance of the convolutional neural network model. While in other datasets, the distance of the hand from the camera was reported to be fixed such as 0.5 m, 0.75 m or 1 m. This dataset contains images varying 0.5 m, 0.75 m and 1 m hand distance.

In the field of deep learning, when a new dataset is created, it may be considered a new contribution to the field mainly because each dataset has its specific features to improve existing models. However, the availability of several datasets often creates more challenges that require solutions. Therefore, the creation of a custom dataset with special conditions may be considered as a new contribution in the field of sign language interpretation.

Convolutional neural network involves less pre-processing compared to other image classification algorithms. The use of a CNN reduces the images into a format that is easier to process while preserving features that are essential for making accurate predictions. There are four types of operations in a CNN: convolution, pooling, flattening, and fully connected layers

According to the results of the experiments, the training was executed for the first dataset [23] and the obtained accuracy was 99.41% with a 0.0204 loss. Secondly, the training was implemented to the second dataset [24], for which the obtained accuracy was 99.48% and the loss was 0.0210. This study can be improved by adding more images for more letters and words into the dataset. Also, more images can be added to improve accuracy and reduce loss. By the addition of new words and terms, the proposed system may be improved to predict a complete word.

[2] Currently treating sign language issues and producing high quality solutions has attracted researchers and practitioner's attention due to considerable prevalence of hearing disabilities around the world.

The literature shows that Arabic sign language (ARSL) is one of the most popular sign languages due to its rate of use.

ARSL is categorized into two groups:

- The first group is ARSL alphabetic (ARSLA), where each Arabic letter is represented by a sign.
- The second group is ARSL, where words are represented by signs i.e., picture.

This paper introduces a real time ARSLA recognition model using deep learning architecture. As a methodology, the proceeding steps were followed.

[3] Due to the lack of assistive resources, hard-of-hearing people cannot live independently. Sign language or gesture language is the natural language and it is the primary mode of communication for hard-of-hearing people. Researchers and IT companies are continuously trying to find the best solutions to minimize the communication barriers for hearing-impaired people. Existing translation techniques for speech to sign language on the web platform are consuming higher resources. This study presents an optimized technique for direct machine translation of multi-lingual speech to Indian sign language using the HamNoSys notation system, whereas existing techniques were translating speech-text-HamNoSys. Performance comparison of both existing and the proposed techniques is analyzed in this study. The proposed technique optimizes the resources for the following parameters: CPU, heap memory, primary memory, and classes load. The result shows that the existing technique takes 220 MB heap memory, 10 threads, 2236 classes, and CPU for 12 s. The proposed technique consumes only 210.4 MB, 9 threads, 2113 classes, and CPU for 9 s.

CONCLUSION:

From this literature survey done on the communication system for specially abled people, it is proposed to implement this project **Real time communication System powered by AI for specially abled** using mobile application. The methodology is based on Hidden Markov Models movement of H-frame, Image processing and Object detection combined together.

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