Sign Language Recognition For Disabled Using Bot

[1]Shruthi K R, [2] Ramyashree R, [3]Likith Gowda, [4]Deeksha K, [5]Spoorthi Gangadhar

[1]Assistant Professor, [2,3,4,5] UG Students, Dept. of Information Science &Engineering,
Global Academy of Technology, Bangalore, India.

Abstract: Sign language is a language that uses manual communication to convey meaning. This includes simultaneously employing hand gestures, movement, orientation of the fingers, arms or body, and facial expressions. Sign Language Recognition for Disabled BOT[SLRDBOT] has been designed to understand not only human voice but hand signs language as well. It has been designed in such a way that it can be used by a wide variety of individuals. SLRDBOT allows the users to: Ask a question normally or ask a question using sign language.

SLRDBOT recognizes the Hand Signs and produces the recognized Alphanumeric Character as output. It forms meaningful sentences and give responses to the queries by recognizing the characters thus breaking down the barriers between normal people and specially abled people. These features have been represented by functions in the program. SLRDBOT then understands the question and then replies appropriately.

IndexTerms – Sign Language, Chat Bot, Tensor Flow, Advanced Driver Systems

I. INTRODUCTION

Inability to speak is considered to be true disability. The communication between a dumb and hearing person poses to be an important disadvantage compared to communication between blind and ancient visual people. This creates an extremely little house for them with communication being associate degree elementary aspect of human life. The blind people can speak freely by implies that of ancient language whereas the dumb have their own manual-visual language referred to as language. Language is also a non-verbal form of intercourse that's found among deaf communities. The languages haven't got a typical origin and hence hard to interpret. A Dumb communication interpreter is also a tool that interprets the hand gestures to sensibility speech.

The objective of the project is to provide a practical way of translating sign language into speech, offering people with vocal and hearing disabilities a means of communication with people incapable of understanding sign language. After surveying existing literature discussing systems dealing with the recognition of sign language and then propose a design of our own that can achieve the desired objective taking practicality and ease of use into account.

This project is mainly focused on breaking down the barriers in communication between normal people and specially abled people by the use of American sign language and normal conversational or communicational language. The project is based on machine learning in which artificial intelligence and deep learning are involved. The coding part of the project is done using python language which is an interpreted high-level program language for general-purpose programming. Python has a design philosophy that emphasizes code readability, notably using significant whitespace. It provides constructs that enable clear programming on both small and large scales. Python features a dynamic type system and automatic memory management. It supports multiple programming paradigms, including object oriented, imperative, functional and procedural and has a large and comprehensive standard library.

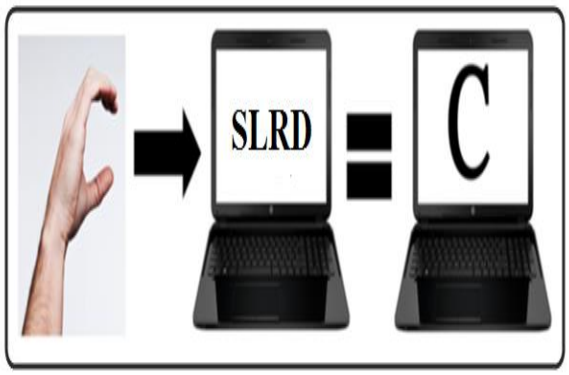


Fig 1:SLRD character conversion

II. OVERVIEW

Development of the project involves the following phases:

1. Requirement Analysis Phase
2. Design Phase
3. Development Phase
4. Testing Phase
5. Release

A good design of a project results in higher degree of extensibility, reusability and maintainability. This in turn helps to reduce the total project development cost. Hence it becomes necessary to find an efficient method to analyse the design of an object oriented software application.

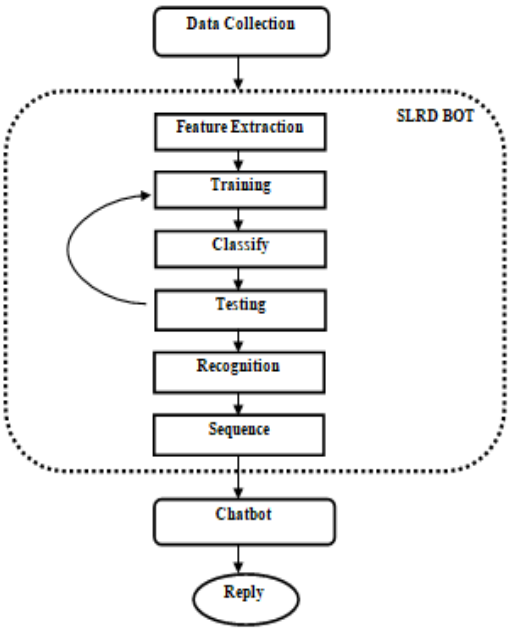


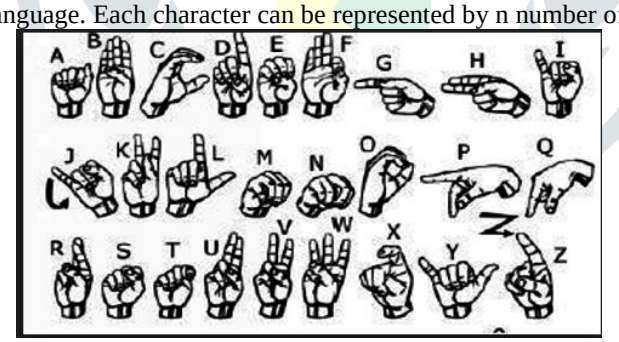
Fig.2.Block diagram of the proposed system

There is a combination of modules:

One is the sign language recognition module which is followed by Chatbot. Initially, the system recognizes the hand sign language gestured by the user which is processed by the system using convolutional neural network. Based on the recognized alphanumeric characters, a meaningful sentence is formed which acts like a query to the chatbot. Chatbot processes this query and replies accordingly.

III **DESIGN**

To begin with, initially, the dataset of Indian sign language is collected from various sources. The Indian sign language is exactly similar to the alphabets of English. Every alphabet has its own symbol.The following figure shows the signs of different characters of Indian sign language. Each character can be represented by n number of individuals with slight variations.

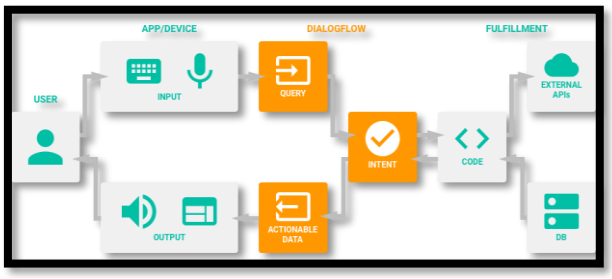


The obtained sequence is given as input or a query to the chatbot. The chatbot is pretrained with the data related to the general queries which replies accordingly using the trained information from database or external server.

Chatbot:

A chatbot is a computer program or an artificial intelligence which conducts a conversation via auditory or textual methods. Such programs are often designed to convincingly simulate how a human would behave as a conversational partner, thereby passing the Turing test. Chatbots are typically used in dialog systems for various practical purposes including customer service or information acquisition. Some chatterbots use sophisticated natural language processing systems, but many simpler systems scan for keywords within the input, then pull a reply with the most matching keywords, or the most similar wording pattern, from a database.

The chatbot gets its input from the user through the microphone. This input enters the dialog flow API as a query which is compared to match with trained list of intents. Intent basically help the bot perceive the users input and decide the subsequent action.



INFERENCE GRAPH:

An inference graph is a propositional graph in which certain arcs and certain reverse arcs are augmented with channels through which information can flow – meaning the inference graph is both a representation of knowledge and the method for performing inference upon it. Since the characters V and W has only little difference pictorially ,we train them first with the help of inference graph.

gTTS

Google Text-to-Speech is a screen reader application developed by Google for its Android operating system. It powers applications to read aloud (speak) the text on the screen which support many languages. Text-to-Speech may be used by apps such as Google Play Books for reading books aloud, by Google Translate for reading aloud translations providing useful insight to the pronunciation of words, by Google Talkback and other spoken feedback accessibility-based applications, as well as by third-party apps. Users must install voice data for each language.

For every expression mapped to an intent, the bot needs to figure out the respective input that the user wants information about. The bot does this with the help of entities, which are powerful tools used to extract the parameter values from the users query, there by processing natural language to convert it into actionable data.

If this is not possible, then the application calls the google assistant APIs/ internal database to get the list of libraries related to the keywords. The bot sends the list of libraries back to the application by calling the APIs. The application now generates audio and textual response as output.

IV SLRD BOT IMPLEMENTATION

Some of the important implementation details are as follows

- Object detection using webcam
  Object Detection is the process of finding real-world object instances like car, bike, TV, flowers, and humans in still images or Videos. It allows for the recognition, localization, and detection of multiple objects within an image which provides us with a much better understanding of an image as a whole. It is commonly used in applications such as image retrieval, security, surveillance, and advanced driver assistance systems (ADAS).

- TFRecord

  If you are working with large datasets, using a binary file format for storage of your data can have a significant impact on the performance of your import pipeline and as a consequence on the training time of your model. Binary data takes up less space on disk, takes less time to copy and can be read much more efficiently from disk. This is especially true if your data is stored on spinning disks, due to the much lower read/write performance in comparison with SSDs.However, pure performance isn't the only advantage of the TFRecord file format. It is optimized for use with Tensorflow in multiple ways. To start with, it makes it easy to combine multiple datasets and integrates seamlessly with the data import and preprocessing functionality provided by the library. Especially for datasets that are too large to be stored fully in memory this is an advantage as only the data that is required at the time (e.g. a batch) is loaded from disk and then processed. Another major advantage of TFRecords is that it is possible to store sequence data—for instance, a time series or word encodings—in a way that allows for very efficient and (from a coding perspective) convenient import of this type of data. So, there are a lot of advantages to using TFRecords. But where there is light, there must be shadow and in the case of TFRecords the downside is that you have to convert your data to this format in the first place and only limited documentation is available on how to do that.

V. Experimental Results

The characters A,V, W ,I , L and C has been trained and detected. The output snapshots are as follows

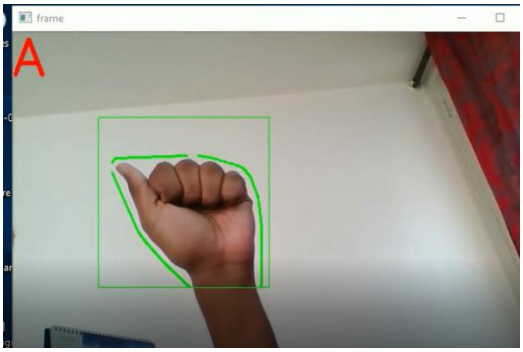


Fig 3:Character A

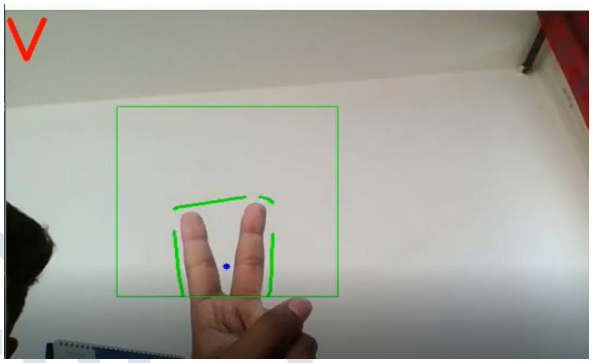


Fig 4:Character V

VI. CONCLUSION

The project is a sign language chatbot that helps to cut down the difficulties faced in the communication by normal people and hearing impaired people. In the proposed model, the dataset related to Indian Sign Language is used. This dataset is trained and is used to compare and process with hand gestures given by the user as input which is live fed through webcam. Further, all the recognised hand gestures forms meaningful sentences, for which the developed SLRD BOT gives, appropriate audio and textual response. SLRD BOT acts as bridge between hearing majority and the deaf community for communication.

The system shows promising results with the help of trained data stored on a database. Using this as a platform, many higher end applications can be developed and the difficulties in communication can be eradicated widely. Thus, the barriers in communication between normal people and specially abled people can be broken down.

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