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AI ML BASED VIRTUAL TECHNOLOGY ASSISTANCE FOR DISABLED

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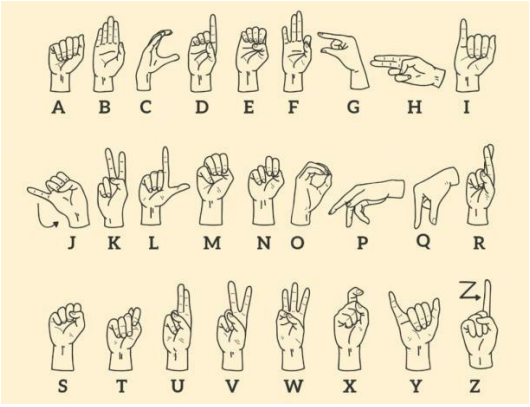
Abstract: Being confronted by ailments such as blindness, hearing loss, or deafness is becoming more common. Individuals have become increasingly dependent on comfort as a result of science and invention, yet there is a group of disadvantaged people working to develop an innovative way to make communication simpler for them. The Globe Health Organization estimates that there are roughly 285 million blind individuals, 300 million deaf people, and 1 million mute persons in the world. The primary forms of communication for individuals with disabilities are sign language and braille. Without a translation, it can be difficult for people with impairments to communicate with others. Because of this, implementing a technology that understands sign language would significantly and favourably affect the social lives of impaired individuals. In this research, we've put forth a visual, marker-free system to recognise Indian Sign Language as a portable communication tool for use with or among impaired individuals.

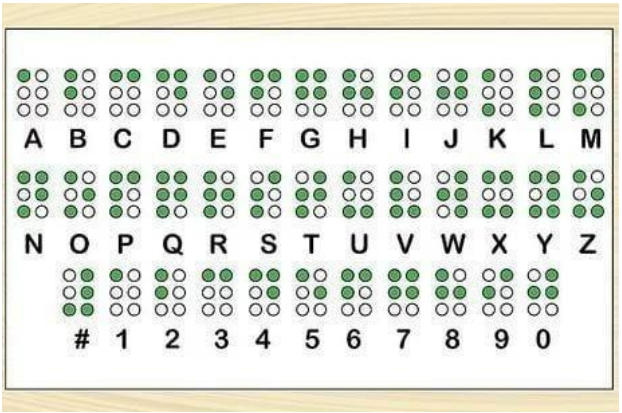
Keywords: Braille, Sign Language, BOF, SVM.

I. INTRODUCTION

Humans communicate with one another either by the use of natural language, such as spoken words or written words, or through the use of body language (gestures), such as hand motions, head gestures, facial expressions, lip motion, and so forth.

Daily living involves a lot of communication. However, it is highly challenging for regular people to converse with the deaf, dumb, and blind, and the reverse is also true. Deaf and stupid individuals communicate using sign language because hearingpeople cannot comprehend sign language. Therefore, sign language conversion is necessary. People with visual impairmentsfrequently utilize the Braille Coding System to read and write. This technique enables those with visual impairments to readand write with a single touch rather than vision by creating the characters on paper using patterns of raised dots.





Communication is essential in our everyday lives because it allows us to transfer information from one person to the next. Therefore, it is difficult for persons who are deaf and dumb to engage with ordinary people. To communicate with them, only sign language is permitted. Nonetheless, most people are unfamiliar with sign language. There is just one method for translating sign language into text and voice, as well as vice versa. This is what sign recognition entails. Sign language is a combination of body language, hand movements, and facial expressions. The majority of the research is focused on decodinghand gestures because they contain the majority of the information.

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There are two methods for decoding hand gestures, which are given below:

a) Image-Based
b) Sensor-Based

As sensor-based hand gloves and hardware are required, the approach described above is exceedingly sophisticated and challenging to fix. But the image-based approach is very simple to use and apply. The many sign languages that are used across the world are distinct from one another.

II. LITERATURE SURVEY

A. Braille Image Recognition for Beginners:

The most challenging method of reading Braille is one of a person's haptic (touch-related) talents. The Braille pattern is made up of a huge variety of patterns from different languages. As a result, throughout the learning process, the pupils are genuinely dependent on their teachers. It is asserted that in order to generate accurate transcriptions, there has to be direct interaction between teachers and pupils. This paper attempts to convert braille visual patterns into a text that can be read using the alphabet. This system uses Bag of Clustering technique(BOF) which consists of SURF and k-mean clustering. The image classification is done using the Support Vector Machine (SVM) technique. The results from the accuracy testingis found to be 97.44% of successful recognition accuracy is achieved. One letter at a time can only be recognized by this method. It may be improved any further so that it can detect words and phrases more quickly.

B. Sign Language Recognition Using Template Matching:

Different motions are utilized as gestures during conversation. Hand or body movements are used. Gestures used in sign language often involve visually communicated patterns. This study uses a template matching approach to identify sign language. Techniques for image processing are used to construct the system. Here, an image is taken and turned into a grayscale version. To find the sign, we employ the edge detection tion approach. This system's drawback is that it can only translate movements into text. We can continue to designa two-way system that allows for the conversion of text to sign and sign to text. We may also use a system where gestures change throughout interpretation.

C. Sign Language Recognition Based on Computer Vision:

The purpose of this article is to use computer vision to recognise sign language. In this study, a system to recognise character-level sign language, such as American sign language and Arabic numerals, is developed by using the CNN neural network to extract features from ASL data and the LSTM classifier to categorise it. Moreover, sign language translation ispossible by transforming user text or voice input into the appropriate American sign language or Arabic numeric sign language. The inability of this technology to recognise gesture targets is a problem.

We propose a modified long short-term memory (LSTM) model for continuous sequences of gestures, also known as continuous SLR, that can recognise a series of connected gestures in this work. Its base is the segmentation of continuous signals into smaller bits, followed by neural network modelling of those smaller components. Thus, it is not necessary to take into account a separate set of sub-units while training.

D. Moment Based Sign Language Recognition for Indian Languages:

This article's only focus is on Indian Sign Languages (ISL). India has more than 615 official languages, each of which varies depending on area and culture. As a result, sign recognition is also done using different languages. Other forms of sign language, such as handed sign language, include double- and single-handed forms. In this effort, double handed sign language is employed for sign recognition in order to standardize ISL. In the procedure described in this research, motions will be recorded using a web camera and pre-processed in MATLAB. When the picture has been analyzed, feature extractioncomes next, which is then followed by a classifier. The classifier then plays audio in Hindi and English and presents the identified movements as text.

III. EXISITING SYSTEM

1. Speech to Sign Language:

Comprehension of Sign Language system is developed using computer vision to recognise Arabic numbers and American sign language at the character level. The ASL data's attributes are extracted using the CNN neural network, and the LSTM classifier is then given the information.

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Moreover, the technology enables sign language translation by converting user textor voice input into the appropriate American sign language or Arabic numeral sign language. The system's shortcoming is the intricacy of gesture target detection.

2. Braille to Text and Text to Braille:

Braille Image Recognition for Beginners: This system uses Bag of Clustering technique(BOF) which consists of SURF and k-mean clustering. The image classification is done using the Support Vector Machine (SVM) technique. The results from the accuracy testing is found to be 97.44% of successful recognition accuracy is achieved. This system can only recognize a single letter at a time. It can be further improvised to be able to recognize words and sentences with greater operational speed.

IV. PROPOSED SYSTEM

1. Speech to Sign Language:

The goal is to translate voice and audio into sign language utilising animations and natural language processing to improve the communication skills of those with speaking and hearing impairments. to offer a user-friendly solution that lowers the effort required for communication.

An online tool that translates live audio voice recordings into text and shows the appropriate Indian Sign Language animations. Voice recognition using the JavaScript Web Speech API on the front end.

Django, an open-source framework for backend online applications based on Python, is the web framework being utilised in this case. It promotes quick development, pragmatic design, and also makes it easier for client and server http interactions Natural Language Toolkit (NLTK), which offers a practical introduction to language processing, is utilised inorder to process the user's spoken natural language.

The Punkt Sentence Tokenizer in NLTK creates a list of sentences from a text by building a model for words that start sentences, collocations, and abbreviations.

2. Braille to Text:

The code redirects the path to the Braille image from the textEdit widget. Defines a dictionary called target that maps eachlowercase letter in the alphabet to a one-hot encoded list of 27 elements. The last element of the list is used to represent a space character. Loads a pre-trained Keras model from the file "braille_train.h5". Keras applications module is used to give deep neural network pre-trained models. Keras models are used to make predictions, extract features, and fine-tune them. It loads the Braille image, resizes it to 28x28 pixels, normalizes the pixel values, and adds an extra dimension to theimage data. It uses the loaded model to make a prediction on the image. Post-processes the prediction by thresholding it at 0.6 and converting the result to a one-hot encoded list. Compares the post-processed prediction to each of the target valuesin the target dictionary, and if a match is found, the corresponding character is printed and displayed in the textEdit_2 widget.

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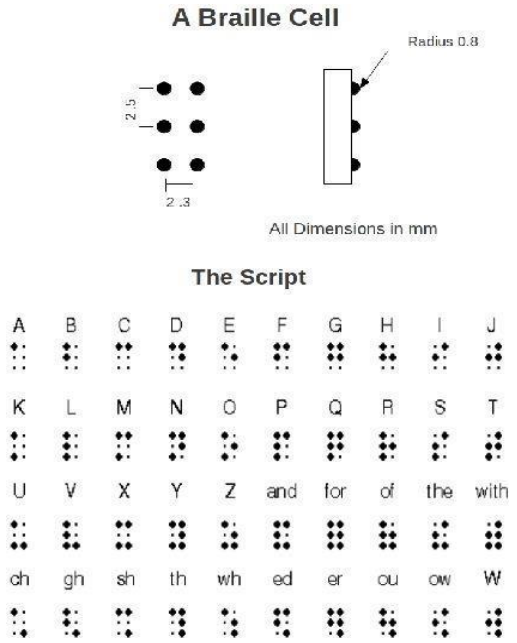
PyQt5 is a cross-platform GUI toolkit that includes a set of Python bindings for Qt v5 and is used to create interactive desktop applications with ease thanks to the tools and simplicity given by this library.

3. Text to Braille:

The code uses two dictionaries: ascii_braille and charToArray. Ascii_braille maps characters to their Braille representationas a string of dots and spaces, while charToArray maps characters to arrays of integers representing their Braille dots.
The textToBraille function takes a text string as input and outputs its Braille representation. The function converts each character of the input text to lowercase, and then maps it to its Braille representation using the ascii_braille dictionary. TheBraille representation is then appended to a final string, which is returned as the result of the function. The writeText function takes a string of Braille characters as input and outputs a string of dots and spaces representing the Braille characters. The function uses a loop to iterate over each character in the input string and maps it to its Braille representation using the ascii_braille dictionary. The Braille representation is then appended to a final string, which is returned as the result of the function.



V. CONCLUSION

The main objective is to help the disabled by providing a platform where they will not be held back because of their disabilities and will be capable to communicate much confidently with others. Implementing the Support Vector Machine (SVM) method The accuracy testing is done to gauge how well the study's findings performed. A braille image recognitionmethod that can identify words or phrases may be pursued in subsequent research. Edge detection method was utilized to find the sign in the picture during sign to voice conversion. The procedure there entails removing noise and other irrelevantdata, applying a smoothing algorithm to the picture, determining the gradient's magnitude, and then tracing the edges usinghysteresis. The main motive is to create a software which will help us to provide the necessary bridge to achieve a suitable communication technique to help them. Hence this software will assist us in providing the essential bridge to accomplish asuitable communication between particularly abled and non-disabled.

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