Project Reference Number: **46S_BE_5108**

Title of the project: **DHVANI:-A SIGN LANGUAGE TRANSLATOR FOR DEAF-MUTE**

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Introduction:

For those who have hearing issues, sign language is the most natural and expressive medium. Non-deaf people never attempt to learn sign language in order to communicate with others who are deaf. Deaf persons get isolated as a result of this. The gap between the hearing community and the general public could be reduced, though, if a computer could be designed to convert sign language into text. Every alphabet in Indian Sign Language (ISL) is represented by two hands, and the alphabets of the gestures are adapted from British Sign Language (BSL) and French Sign Language (FSL). Since American Sign Language (ASL) signs are typically made alone and have a lower level of complexity, the majority of researchers in this field concentrate on ASL recognition. Another intriguing aspect of ASL is that it already has a usable standard database. Indian Sign Language (ISL), which is based on both hands instead of just one, is more complicated to recognise than American Sign Language (ASL) [1]. Researchers have conducted some research into ISL recognition.. Currently, more researchers have started doing research in ISL. Here this

proposed system is able to recognize the various alphabets of the Indian sign language; this will reduce noise and give accurate results. The major research problem in computer recognition is sign language to enable communication with. Hearing impaired people. This system introduces efficient and fast techniques for the identification of the hand gesture that represents a sign language alphabet. Currently, more interest is being created to do research in the field of sign language recognition system [2]. Sign language is the most common language used by people with disabilities. For people who are unable to speak and listen, this may be one of the simplest ways of interacting. In our society, normal people can easily interact with another normal person, in the same way people with disabilities can easily interact with another person with disabilities, but normal people and people with disabilities cannot interact with each other in a very easy way. To remove or reduce this communication gap between normal people and hearing-impaired people, the Sign Language Translator is used. Between hearing and non-hearing people, the Sign Language Recognition System acts as a communication bridge. The primary objective is to convert sign language to text or voice. The framework makes it easier for deaf persons to use sign language to interact with the outside world. This results in the removal of the intermediary, who typically serves as a translator. By offering speech or text output for a sign gesture input, this would provide a user-friendly environment for the user.

Objectives:

- Bridging communication gap between hearing impaired and normal people
- Converting a sign gestures into text and then voice
- Converting into a regional languages
- Improving accuracy

Methodology:

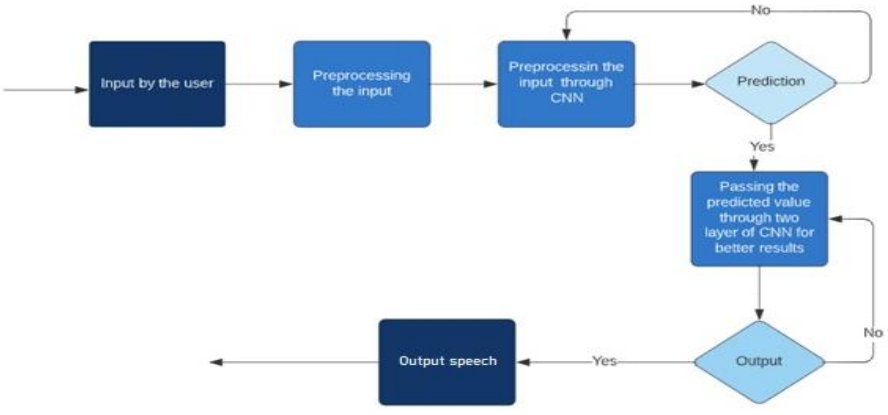

Fig 1: Block diagram of the proposed model

- Input by the user: This step represents the user providing some input data, which could be in the form of images, or any other relevant format.

- Preprocessing: The input data goes through preprocessing, which involves transforming and cleaning the data to make it suitable for further processing. This step could involve tasks such as removing noise, normalizing data, or converting it into a specific format required for the subsequent steps.

- Preprocessing the input through CNN: The preprocessed data is fed into a Convolutional Neural Network (CNN). A CNN is a deep learning algorithm commonly used for analyzing visual data such as images. In this step, the input is processed by the CNN to extract relevant features and patterns.

- Prediction: The output from the CNN is used for making predictions. This could involve classifying the input into specific categories, recognizing objects in images, or predicting numerical values based on the given input.

- Passing the value through two layers of CNN for better results: The prediction obtained from the previous step is passed through two additional layers of CNN.

- Output: The refined prediction from the second layer of CNN is obtained as the output. It could be in the form of a class label, a set of recognized objects, or any other relevant information based on the nature of the problem

- Output speech: The final output is converted into speech form, allowing it to be presented audibly to the user. This step is particularly useful for scenarios where the user may not have direct visual access to the results or prefers auditory feedback.

Overall, this activity diagram outlines a process that involves taking user input, preprocessing it, applying CNNs for feature extraction and prediction, refining the results through additional CNN layers, and finally presenting the output in speech form.

Results :

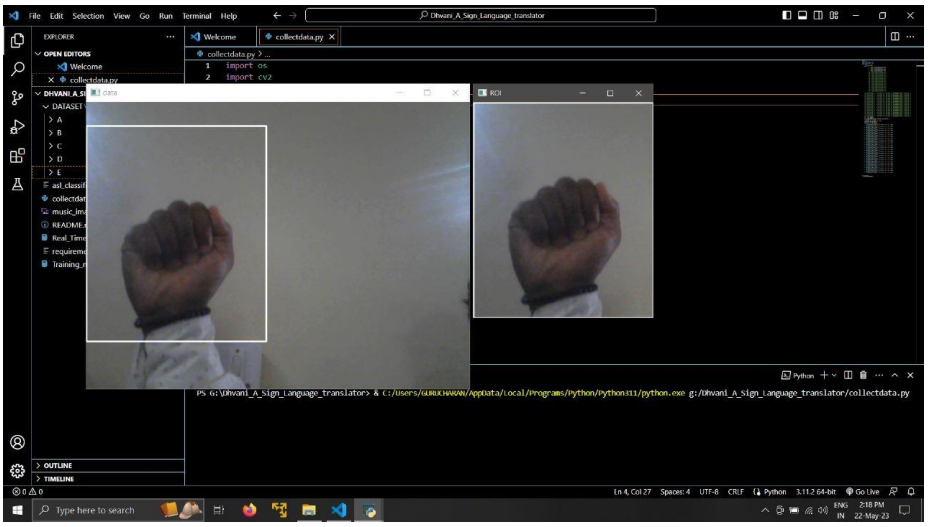

Fig 2:Alphabet A Data collection

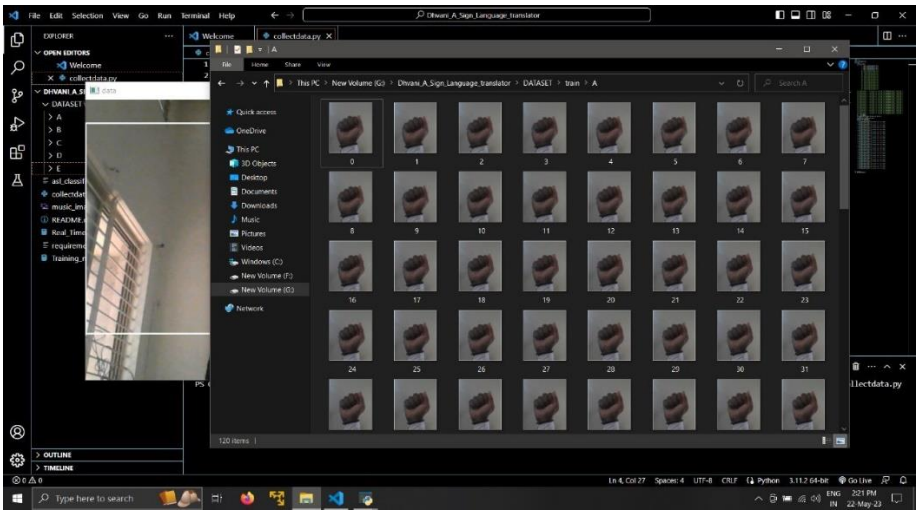

Fig 3: Dataset Folder of Alphabet A

Fig 4: RGB coloure ASL Alphabet E

Fig 5: Gray scaled ASL Alphabet E

Fig 6: Gaussian Blurred image of same

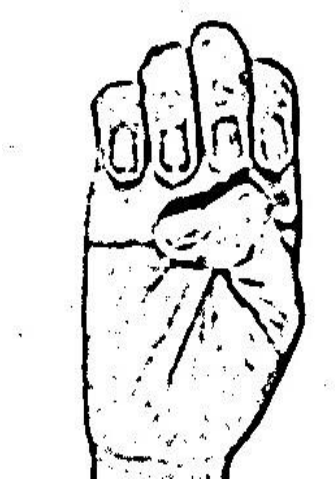

Fig 7: Adaptive Threshold image of same

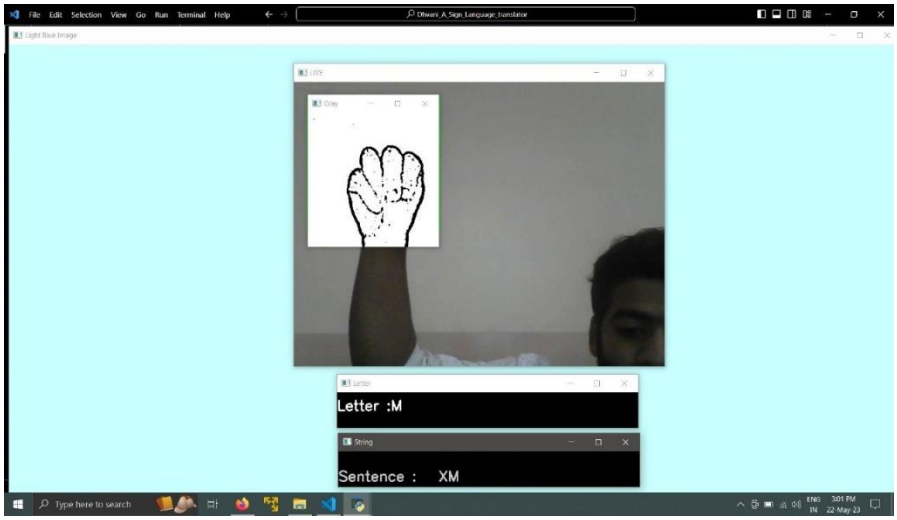

Fig 8: Camera Capturing Alphabet ‘M’ and displayed in text boxes

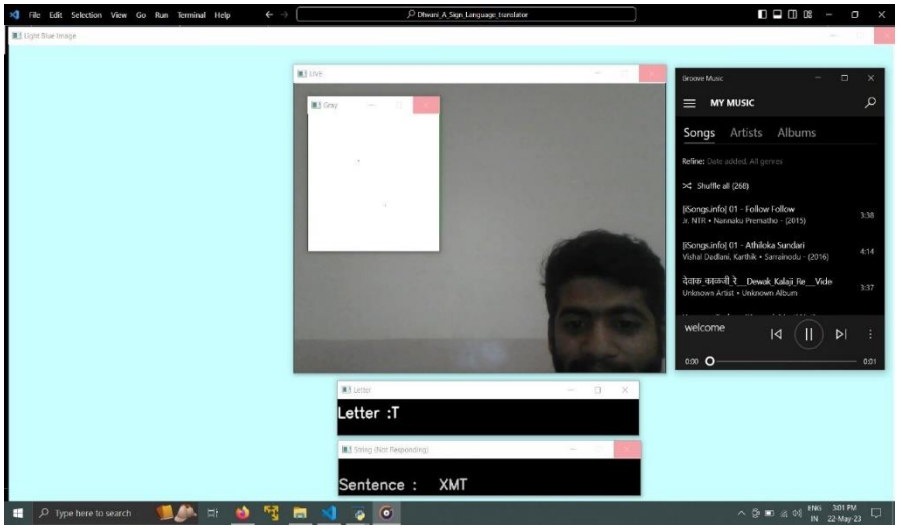

Fig 8.4.d: Pop-up window playing the audio of converted text

Conclusions:

The system is very user friendly and can be used by any user in very easy manner. He/ she can show American Sign Language (ASL) symbols to the system. The system will detect the symbols in very quick time and display the corresponding English text at the same time. The training and testing dataset are taken from the different set of people which resulted in greater accuracy. Some images in the dataset were taken in bad lighting which resulted in noisy images during image segmentation. The current approach to solve this problem can be broken down into four steps. The modularity of the approach encourages the fact that can work on each of the modules individually to improve their individual performance, and thus a module can always be replaced by a better module to improve the overall accuracy of the chain. Using various image processing concepts and fundamental image properties sought to develop this system. Using this system, the gesture recognition was successful. Linear kernel is used as a training model for several features such as Bag of Visual words, Head On Generation (HOG) features, Gaussian random projection of HOG features and their matrices. Also tried to increase performance by using hierarchical clustering to separate one-handed image from two-handed images and applied linear kernel on single clusters. Here other training approaches such as modifying the kernel and using random forests for training are also used. However, apart from a small number of people, not everyone is familiar with this sign language and may need an interpreter which can be inconvenient and costly. This project aims to reduce this communication gap by developing software capable of predicting the alphanumeric gestures of the ISL hand in real time. The primary goal has been accomplished, namely, the requirement for an interpreter has been eliminated.

FUTURE SCOPE:

The scope of the project is aimed at a Deep Learning (DL) sign translator system that uses hand gesture detection to perform translation functions in the computer using computer vision (OpenCV). It is possible to. develop a complete product that will help people. with speech and hearing problems, thus reducing the communication gap. In the future, there will be the possibility of using more alphabets and math numbers in our datasets and improving. the model so that it recognizes more alphabetic characteristics and at the same time achieves high accuracy. The system can be improved by adding language translation so that even the blind can benefit from it. The implemented project only converts the hand gestures into English

speech as the output. Further it can be implemented to recognize other regional languages like Hindi, Kannada, Marathi, etc. We can add video tutorials in the software so if anyone is unaware of the sign languages then they can quick learn it and communicate easily with differently abled people.