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SIGN LANGUAGE TRANSLATOR

INTRODUCTION

The increased public acceptance and funding for international projects emphasizes the necessity of sign language. The desire for a computer-based solution is significant in these age of technology for the deaf people. However, researchers have been attacking the problem for quite sometimes now and the results are showing some promises. Although interesting technologies become available for voice recognition, but there is currently no commercial solution for sign recognition on the market. Since it's not possible to be accompanied by a translator always, it becomes difficult for these people to communicate with normal people without a translator. Thus, a system that's able to translate sign language into words without a human translator would be extremely helpful to the deaf and mute community. The set of various technology used in the Translation model are – OpenCV, Tensorflow and Media pipe.

OBJECTIVE

The goal is to make computers to understand human language and develop a user-friendly human computer interface (HCI). Some steps toward this goal include teaching a computer to recognize speech, facial emotions, and human gestures. Gestures are the nonverbally exchanged information. Gesture recognition is an aspect of human-computer interaction that demonstrates an academic treatise and is a vital to popularizing the notion of a human-to-human connection, open dialogue, that must imply the correlation between the user and the machine. Gesture analysis is a scientific field that can recognize gestures such as hand, arm, head, and even structural motions that usually entail a certain posture and/or motion. Using hand gestures, the individual may send out more information in a shorter amount of time. Several approaches were explored to apply computer-vision ideas to the real time processing of gesture outputs. The Computer Vision study concentrates on gesture recognition in the openCV framework using the Python language. Language is a huge part in communication. Languages are useless to a person with a disability. Gesture is a vital and meaningful mode of communication for the visually impaired person.

So here is the computer-based method for regular people to understand what the differently abled individual is trying to say. For monitoring, there are various similar algorithms and object recognition systems. This allows the identification of gestures, which overcomes the boundaries and limitations of earlier systems.

METHODOLOGY

1. Data Collection – The first step is the data-set collection. We collect the full frame (RGB) image and the corresponding depth map from the camera. It actually understands the gesture and finger positions and updates it in the Database where all relevant Collection of images are stored.

2. Extraction of Hand Gesture – The Set of relevant images will be processed and assigned a Message that the particular sign language will be conveying. All the images from multiple angles having similar Messages will be grouped together and will be assigned the Text message to be displayed in the Model.

3. Collection of Gestures in Database – The set of all Images conveying the same message have been grouped together as an entity in the database, thus the Database will serve as a collection of multiple number of entities, each of which represents a set of actions / gestures of hand conveying a message.

4. Hand-Gesture Recognition using Deep Learning – Upon User encounter with the model, the user will show hand gestures in front of the camera. Using OpenCV, those images will be processed and compared with a pretrained and preprocessed set of images.

5. Upon any image in the database getting matched with the Gesture, the Mapped Text message linked with the gesture will be displayed on the screen in the form of Text/sentence.

6. If the gesture performed by the user does not matches any linked image in the database, in that scenario, and Error message will be displayed on the screen of the user.

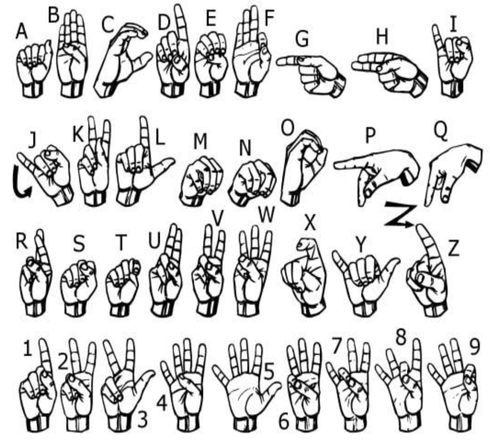

Fig.1 Sign Language[8]

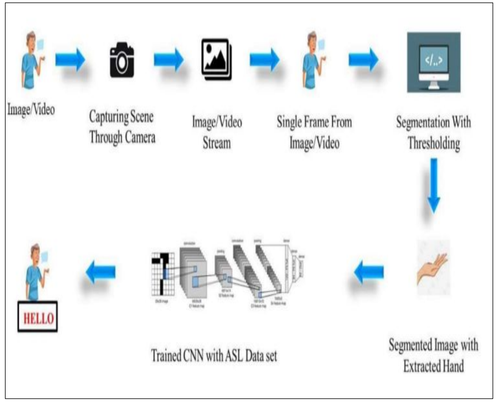

Fig.2 Process

EXPECTED OUTCOME

Upon training the image dataset without any augmentation, the training accuracy achieved was very high (around 99%)[1] but, the real time performance was not up to the mark. It was predicting incorrectly most of the times because in real time hand-gestures were not placed exactly at the center and aligned vertically. In order to overcome this shortcoming, we trained our model by augmenting our dataset. The training accuracy was reduced to 89% but the real-time predictions were predominantly correct. The Model can provide an efficient and accurate way to convert sign language into text or voice has aids for the hearing impaired for example, or enabling very young children to interact with computers (recognizing sign language), among others. The Model is capable to Provide Real Time Functioning, Portability and has no need of Calibration. In future work, large scale proposed system can be developed and implemented using Python. Image processing part should be improved so that system will be able to communicate in both directions i.e.it should be capable of converting normal language to sign language and vice versa. We will try to recognize signs that include motion. Moreover, we will focus on converting the sequence of gestures into text i.e., word and sentences and then converting it into the speech which can be heard. Also, when we increase our training image size the accuracy betters itself both during training and real time implementation. However, training images with large size is directly proportional to the computational power of the system.

CONCLUSION

The aim of this project is to predict the ISL alphanumeric hand-gestures in real time. The above work shows that it can be solved with better accuracy when we actually consider the segmented RGB hand-gestures. By applying depth based segmentation we remove the overheads of dynamic background. The segmented RGB hand gestures were fed to 3 layered CNN for training and testing in real time. We were able to achieve training accuracy of 89.30% and testing accuracy of 98.5%. Our model may show good accuracy while predicting results both offline and online. Our project aims to make communication simpler between deaf and dumb people by introducing Computer in communication path so that sign language can be automatically captured, recognized, translated to text and displayed it on Screen. There are various methods for sign language conversion. Some of them use wired electronic glove and others use visual based approach. Moreover, we will focus on converting the sequence of gestures into text i.e., word and sentences and then converting it into the speech which can be heard.

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