Glide: A Communication Aid for Deaf-Mute

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Abstract:- Sign Language is a natural language which deaf-mute community uses for communication.It is very difficult for the hearing-impaired people to communicate with the world.The hand gestures are one of the typical methods used in sign language.The project aims to develop a software "Glide" that enables efficient communication between deaf-mute and normal people.The signs given by the user are captured and processed to produce a text output.The text messages corresponding to the continuous signs will be produced.This text can help the normal people to understand what the person on the other side is trying to communicate.The process of image detection and capturing is done with the help of python assisted with OpenCV.CNN is used for the purpose of training and classification.

Keywords:- CNN, OpenCV, Image detection, Gesture recognition.

I. INTRODUCTION

According to a survey conducted by disabled welfare department, about eight lakh people in India are deaf-mutes. It is said that about nine billion people in the world are deaf-mutes. Communications between deaf-mute and a normal person have always been a challenging task. This paper proposes a framework for recognizing hand gesture which would serve as a way of communication between deaf and dumb-mute and normal people. Deaf-mute individuals lack proper communication with other individuals and find it difficult to properly express themselves. Thus, they are forced to face many issues in this regard. Sign language is their basic means of expressing themselves to others. This calls for the need of a proper translator. In this new era, the deaf-mute individuals contribute to the society through social interactions, occupations and various other means. So an efficient system must be set up, to interact with them, to know their views and ideas. The framework that we introduce in this paper, acts as a communication system for deaf and mute individuals. It would take the sign language as an input which would display the result in the form of text.

Here, we introduce a software called GLIDE that enables efficient communication between deaf-mute and normal people. The idea of the software is to develop a system that converts gestures to text.Gesture recognition is the process by which gestures made by the user are recognized by the receiver[1].The hand gestures are captured using a webcam. The images are then converted into standard size with the help of image pre-processing mechanisms. Using various machine learning algorithms,

the images are being classified, the most significant features are extracted, and the gestures are recognized completely. The recognized gestures will be matched with corresponding alphabets and the texts are displayed. The process of image detection and capturing is done with the help of python assisted with OpenCV. Machine learning mechanisms like CNN are used for the purpose of training and classification. The corresponding text messages will be displayed. People with physical barriers are the primary users of the system.

II. RELATED WORKS

"Hand Gesture Detection And Conversion To Speech And Text" presents a solution that will automatically recognise the hand gestures and will also convert it into speech and text output so that the deaf and dumb can easily communicate with the normal people[7].A camera attached to computer will capture the images of hand,the detection is done using various techniques of contour analysis and feature extraction.Based on recognised gestures,the recorded soundtrack will be played.The proposal which uses American Sign Language has been develped using OpenCV with well designed and user friendly interface[2].

"Indian Sign Language Translator Using Gesture Recognition Algorithm" The paper access to develop a system named as ISL using Gesture recognition algorithm,which will translate the gestures made in ISL to English.The first step in the algorithm is gesture acquisition which is responsible for capturing the gesture.The next step is the gesture pre-processing which will enhance the useful data and get rid of unwanted data.It is followed by feature extraction that collects all features and store it in a code vector.Then,template matching is done by comparing it with existing codebook vectors.Based on the output of template matching,classification is done and finally the Gesture is recognised[3].

"A Real-time Continuous Gesture Recognition System for Sign Language"The authors Rund-Huei Liang,Ming Ouhyoung presented a real time continuous gesture recognition system for sign language using DataGlove[4].They tried to build a system for Taiwanese Sign Language.Hidden Markov Models(HMM) have been used to implement the system.

"Sign Language Convertor" Taner Arsan and Oguz ulgen[5] designed a system for converting sign language to voice and voice to sign language.Sign language conversion is done using a motion capture system and for voice conversion, the voice recognition system is used[6].The

signs are being captured and are dictated on the screen as writing.The sign language meaning of the captured voice are displayed on the screen as motioned image or video.

"Conversion of Sign Language into Text"In this paper,MATLAB is being used for the recognition of 26 hand gestures in the Indian Sign Language.The four main modules in the proposed system includes the pre-processing and hand segmentation, feature extraction,recognition of gestures and sign to text.The Linear Discriminant Algorithm(LDA) was used for gesture recognition.

III. PROPOSED METHOD

Communication is very important in a person's life,understanding is the major aspect of communication.But the communication between differently abled people and the normal people tends to be quite difficult, like the deaf-mute people communicate through sign languages which the normal people might not know and the lack of awareness of the deaf-mute culture is also a problem,so for rendering this problem we are proposing a software for the efficient communication between the deaf-mute and normal people.Glide is the name of the software.For the communication between deaf-mute and normal people,hand gestures are one of the typical methods

used in sign language.These hand gestures which are given as input by the user will be captured and identified and the corresponding text will be given as output.The end users are the deaf and mute people and the need for a third party intermediate is eliminated.The aim of this project is to develop a system that can convert the hand gestures into text.

The detection of hand gestures can be done using camera,the pictures are then converted into standard size with the help of image pre-processing,these pictures are then placed in the database and by using database matching the image is converted to text.The detection involves observation of hand movement.Image pre-processing and segmentation for morphological filtering and segmentation.Feature extraction helps in extracting the most significant features.

Template Matching is used for comparing existing vectors with those in database.classification is used for classifying gestures using CNN Algorithms.gesture recognition recognizes the gestures completely and the appropriate output is produced.GLIDE would definitely help the deaf-mute people to blend in with the normal people and communicate with them effectively,thus avoiding the social stigma and prejudices.
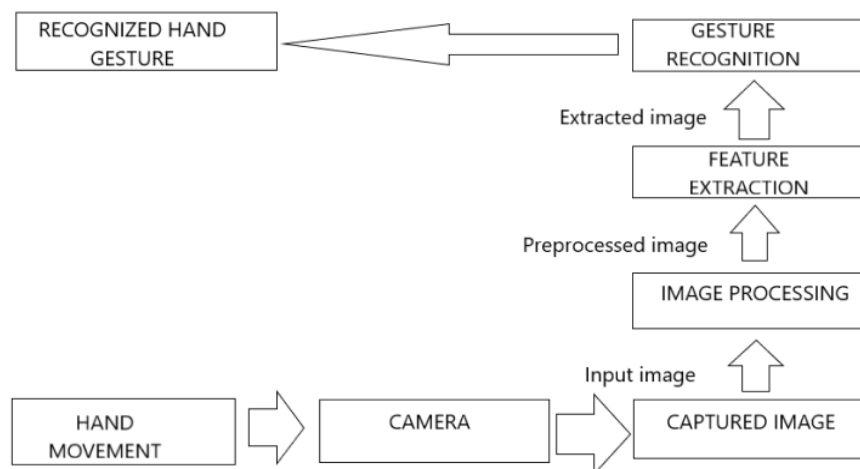

Fig 1:- System Design

IV. PROJECT DESIGN AND IMPLEMENTATION

This is a cross-platform software based on python.Open cv converts the analog world into the digital world.So that the computer can understand.Algorithms like CNN makes the software to recognize the state of the hand.Now combining that along with the training data set will solve the problem,hence we get a prediction.

The system consists of four modules:
➢ Hand Detection
➢ Dataset Creation
➢ Training
➢ Testing

A. Phase 1: Hand Detection
Hand detection is one of the most essential and basic requirement in an efficient sign translator.It enables the detection as well as the recognition of the hand gesture. The real values consists of analog data but the computer understands only discrete digital data.Open computer vision is able to gather this data from a computer camera and process them.Image capturing is done by open cv.For the computer to understand the image taken,it has to be enhanced.Enhancing the image elaborates it and eliminate other subjects from its environment.Thus reducing the environmental noise and improves accuracy.
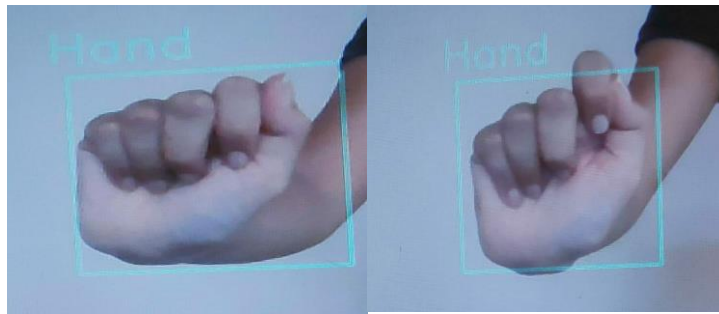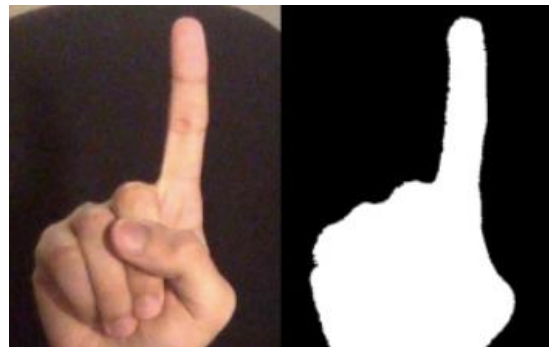
Fig 2:- Hand detection

Fig 3:- Converting RGB image to Grayscale

B. Phase 2: Dataset Creation

Dataset creation is used in creating enough data for the correct prediction of a gesture.Open cv collects sample data set.This is then used for training purpose data for hand gesture identification follows several standards like american and indian.Data collection should be based on which standard used.The best data set gives better outcomes.

Fig 4:- Sample folder of letter A

Fig 5:- Sample folder of letter F

C. Phase 3: Training

Algorithms like KNN can be used to train the system.Basically in this project,we need to classify each gesture.Using a convolutional neural network,we can assign importance to each data in the dataset which assigns weight and bias to the neural network.This enables the def to predict more accurately the the given image.For better prediction accuracy we need to set the system with an optimal number of data set.Each image in the dataset is mapped to the corresponding gesture.Thus each time a gesture shows.

D. Phase 4: Testing

Now we have to test the accuracy of the prediction of the trained model.For the purpose of testing,several validation data sets are shown to the model.This improves the accuracy of the data.
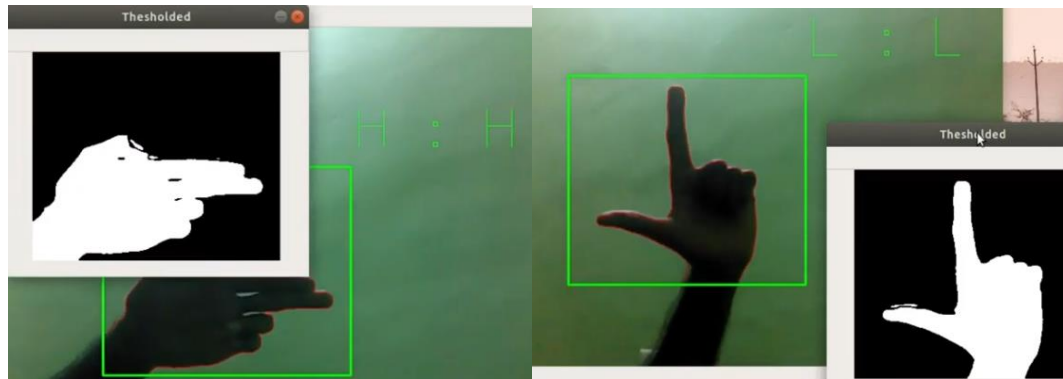
Fig 6:- Recognition of the gestures

V. RESULT

The software called GLIDE is developed to ensure smooth and convenient communication between the deaf-mutes and normal people. People with communication disabilities can make use of the app to convey their messages as well as ideas to others. This software avoids the need for an intermediator in case of communication between deaf-mutes and normal people.A software equipped with facilities to overcome the communication gap between deaf-mutes is developed.

VI. CONCLUSION

The speech and hearing impaired people experience a certain difficulty in communicating with the normal people.The normal people also find it difficult to comprehend the gestures of a daef-mute person.The project aims to aid the deaf-mute people in the ease of communication with a normal person,thus overcoming the difficulties.For communication,they mainly use sign language.These sign language involves hand gestures.These gestures are detected using a webcam and the meaning of the implication behind that gesture is derived,using image pre-processing,the image is modified and finally they are placed in a database and compared using database matching and finally converted to text.

The project is applicable in a variety of fields and has many advantages as well.A lot of differently abled people are working in all sorts of organisations,top positions at that.So,this software tends to be very useful in the present scenario.Students with speech speech and hearing impairment can use the software in schools and colleges improving both their mental and physical development.This software can also be used by doctors in hospitals,clinics and both governmental and non-governmental organisations,social service agencies and lots of other places[8].This project helps in ensuring a better place or an equal place for the deaf-mute people just like normal people.The future work includes developing mobile applications of similar systems that ensure ease among the deaf-mute and normal people[9].

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