SNCHAR
(Sign Language Character Recognition)

Synopsis

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INTRODUCTION

Communication is very crucial to human beings, as it enables us to express ourselves. We communicate through speech, gestures, body language, reading, writing or through visual aids, speech being one of the most commonly used among them. However, unfortunately, for the speaking and hearing impaired minority, there is a communication gap. Visual aids, or an interpreter, are used for communicating with them. However, these methods are rather cumbersome and expensive, and can't be used in an emergency. Sign Language chiefly uses manual communication to convey meaning. This involves simultaneously combining hand shapes, orientations and movement of the hands, arms or body to express the speaker's thoughts.

Sign Language consists of fingerspelling, which spells out words character by character, and word level association which involves hand gestures that convey the word meaning. Fingerspelling is a vital tool in sign language, as it enables the communication of names, addresses and other words that do not carry a meaning in word level association. In spite of this, fingerspelling is not widely used as it is challenging to understand and difficult to use. Moreover, there is no universal sign language and very few people know it, which makes it an inadequate alternative for communication.

A system for sign language recognition that classifies finger spelling can solve this problem. Various machine learning algorithms are used and their accuracies are recorded and compared in this report.

PROBLEM STATEMENT

In our progressive society, it is necessary to socialize with all people to whether for recreation or for a purpose. Communication is important for every human being. However, people who have a hearing disability and/or a speech disability need a different way to communicate other than vocal communication. They resort to sign language to communicate with each other. However, Sign Language requires a lot of training to be understood and learn and not every person may understand what the sign language gestures mean. Learning sign language is also time consuming as there are no effective, portable tool for recognizing sign language. Hearing or Speech disabled people who know Sign Language require a translator who also knows Sign Language to explain their thoughts to other people in an effective manner. To help overcome these problems, this system helps hearing or speech disabled people to learn as well as translate their sign language. Sign language is the preferred method of communication among the deaf and the hearing impaired people all over the world. Recognition of sign language can have varying degree of success when used in a computer vision or any other methods. Sign language is said to have a structured set of gestures in which each gesture is having a specific meaning.

We propose a solution to this problem as SNCHAR will allow easy interaction between the deaf and the hearing impaired people and the ones who are not.

Here ,"SN stands for Sign language, CHA for Character, and R for Recognition system".

OBJECTIVE & SCOPE OF STUDY

Deaf and dumb people communicate among themselves using sign language but normal people find it difficult to understand their language. Using both hands often leads to obscurity of features due to overlapping of hands.

OBJECTIVE

Our project aims at taking the basic step in bridging the communication gap between normal people and deaf and dumb people using Sign language. Effective extension of this project to words and common expressions may not only make the deaf and dumb people communicate faster and easier with outer world, but also provide a boost in developing autonomous systems for understanding and aiding them

LITERATURE REVIEW OF PAST STUDIES

Many Different approaches have been used by different researchers for recognition of different hand gestures which were implemented in different fields. Few of the approaches were vision based approaches, soft computing approaches like Artificial Neural Network, Genetic Algorithm, Fuzzy logic, data glove based approaches, and others like Canonical Analysis, PCA etc. All approaches could be divided into three categories- Feature extraction approaches, Hand segmentation approaches and Gesture recognition approaches. Few of the approaches have been discussed in this paper. Many researchers used skin filtering technique for segmentation of hand. This technique separates non-skin colored pixels from the skin colored pixels, thus extracting the hand from the background image. Fang used Adaptive Boost algorithm which could not only detect single hand but also the overlapped hands. In external aid like color gloves, data gloves were used by the researchers for segmentation purpose. In Principal Component Analysis (PCA) was used for extracting features for recognition of various hand gesture.

STUDY AREA IDENTIFICATION AND DATA COLLECTION

- **OPERATING SYSTEM** – Windows 10/ Windows 2008

- **SOFTWARE REQUIREMENT –**
  - Python 3.5
  - Numpy
  - OpenCV
  - Tensorflow
  - Keras
  - Matplotlib

- **HARDWARE REQUIREMENT –**

The most common set of requirements defined by any operating system or software application is the physical computer resources, also known as hardware. A hardware requirements list is often accompanied by a hardware compatibility list (HCL), especially in case of operating systems. An HCL lists tested, compatible, and sometimes incompatible hardware devices for a particular operating system or application.

Components	Minimum	Recommended
Processor	Intel Core i3-2100 2nd generation	Intel Core i7 5th generation
RAM	4 GB	8GB

MODULE

- **Image Acquisition :-**

The first step of Image Acquisition is of acquiring an image during runtime through integrated camera and while acquiring these images will be stored in the directory after they are captured and the recently captured image will be acquired and that image will be compared with images stored for specific letter in the database using the algorithm and the comparison will give the gesture that was done and the translated text for the following gesture. The images will be captured through basic code of opening a web cam through OPENCV and then capturing the image through frames per second which will be stored in another directory where all the inputs images are stored in another directory and the recent captured image is picked up and the comparison with given set of images are made.

- **Feature Extraction :-**

For any of the object there are many features, interesting points on the object, which can be extracted to provide a "feature" description of the object. SIFT image features gives a set of features of an object which are not affected by many of the complications experienced in other methods, like object scaling and rotation. SIFT approach, for generation of image feature, takes a picture and transform it into a "big collection of local feature vectors". Each of the feature vectors never changes to any of scaling, rotation or translation of the image. To extract such features the algorithm applies a 4 stage filtering approach

- **Orientation Detection :-**

In it, will take the input of hand movement in any of the form or any orientation the gesture will be detected by the described

section of feature extraction as the algorithm also includes the orientation assignment procedure.

- **Gesture Recognition :-**

Finally when the whole process is complete the application will be then converted into its recognized character or alphabet from the gesture which might be helpful to be understood in layman's language. The following process contain passing out the 1- dimensional array of 26 character corresponding to alphabets has been passed where the image number stored in database is provided in the array.

APPLICATIONS

- It will help to bridge the gap between normal, deaf and dumb people.

- The ability of telecommunications to help sign language users communicate with each other.

- In order to facilitate communication between deaf and hearing people, sign language interpreters are often used.

- In [video remote interpreting](#) (VRI), the two clients (a sign language user and a hearing person who wish to communicate with each other) are in one location, and the interpreter is in another. The interpreter communicates with the sign language user via a video telecommunications link, and with the hearing person by an audio link. VRI can be used for situations in which no on-site interpreters are available.

- Sign language character is sometimes provided for television programmes.

CONCLUSION

The system will provide an interface that can easily communicate with deaf people by Sign Language Recognition. The system is not only can apply in family environment, but also can apply in public. For the Social use these system is very helpful for deaf and dumb people. We will build simple gesture recognizer based on OpenCV toolkit and integrated it into Visionary framework. As a yes gesture we will mark up and down hand motions no matter which hand is used.

RECOMMENDATION FOR FUTURE WORK

The method can be enhanced by considering dataset captured under cluttered backgrounds and different illumination conditions. Sign language character recognition is still a very less explored area. A real-time sign language character recognition system which takes into consideration facial expressions and different contexts will be a great achievement. As a future work 3-D gestures and non-manual signs.

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