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HAND GESTURE RECOGNITION SYSTEM FOR DUMB ANDDEAF PEOPLE

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Abstract - Hand Gesture recognition system is one of the best technique has developed in last few year, the reason behind to get success is ability to cooperate with machine. Body gestures are consider most common way to communication along human and personal computer in virtual world. To developed effective algorithm to that can recognize, interpret, process, and simulate human affections. Advance computing has ability to humanize digital interactions. This pepper introduces application using Computer Vision(CV) to recognize hand gesture. A camera takes live footage and analysis gestures on the basis of analysis system takes decision and recognize gestures.

KeyWords: Hand Gesture, Open CV, MediaPipe, Hand land marks.

1.INTRODUCION

In country like India we found 40 million people are visually impaired person and 2.42 people are deaf and able to speak. The vision and voice are the main problem in this people. They only have one median to connect to society that is sigh language. To the society it is mandatory to understand there sign language. Some time it go's hard to society to understand there sign language. So the we have design a system which may help society to understand there sign language. The system has design with computer system and camera. The system or algorithm is able to recognize sign language. In this algorithm Image processing has used as to recognize sign. The complete algorithm has developed using python programming language. Python is one of the best programing language to do develop complex algorithm.

1.1 Problem Statement

The language of communication for deaf and dumb people is sign language. Most of these physically impaired people are dependent on sign language translators to express their thoughts to rest of the world which may make them feel uncomfortable. This causes these people to isolate from society. Hence, Sign language recognition is very important. A sign language is made of various actions formed by physical movement of body parts i.e. hand, arms and facial expressions.

1.2. SOLUTIONS

The purpose use of hand gestures for recognition of Indian sign language. Hand gesture recognition system user friendly way of interaction with the computer o any computerize machine which is more familiar or easy to use to the human beings. The communication between the dumb, visually impaired person are made only by their expressions and their hand gestures, We may design a system which is able to communicate or can be median for society.

2. BLOCK DIAGRAM

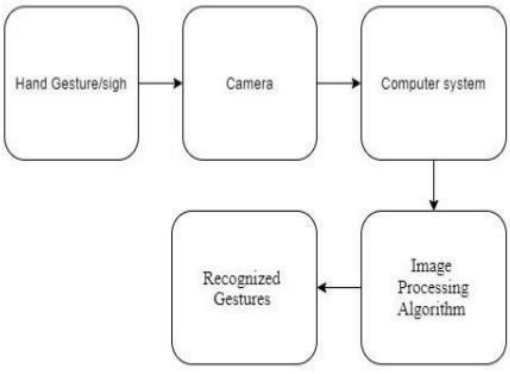
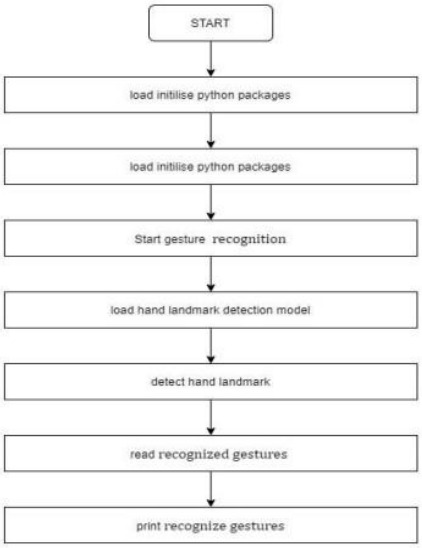


Fig:- Block Diagram

Above fig shows that the block of the proposed system.it this system we have used computer to recognize hand gestures. The input of computer system is given to through the camera. Which can be systems camera or external USB camera. Here in the system hand gestures and of human are the input given to camera. Given hand gestures are getting recognized by applying image processing on to given input to apply image processing we have used python machine algorithms have used.

3.FLOW CHART

Here in the system whole algorithm has developed using python programing language. Python is high level, interpreted programming language which is widely used develop complex machine learning algorithm deep learning algorithms using varies packages. Here in the system we have used bellow's python packages to develop algorithm.



4. USED PROGRAMMING LANGUGE

Here in the system whole algorithm has developed using python programing language. Python is high level, interpreted programming language which is widely used develop complex machine learning algorithm deep learning algorithms using varies packages. Here in the system we have used bellow's python packages to develop algorithm.

4.1 OPEN CV

Open cv computer vision library which is dominated for image processing it also called open source computer vision library. Mainly used for real time computer vision and image processing. The main library has design in c ++. Open CV open source library started in 2011.

4.2 MEDIA PIPE

Media pipe python library which has design for machine learning package which has built in trained data set in tensor flow. it can form the basis for sign language understanding and hand gesture control, and can also enable the overlay of digital content and information on top of the physical world in augmented reality. Media pipe most perfect solution for the hand and finger tracking solution. It employs Deep learning to infer 21 3D landmark on hand. MediaPipe Hands utilizes an ML pipeline consisting of multiple models working together: A palm detection model that operates on the full image and returns an oriented hand bounding box. PyQt5 PyQt5 is a python package. Used to build GUI application.PyQt5's Qtcore module contains all the class of GUI design.

5. RELATED WORK

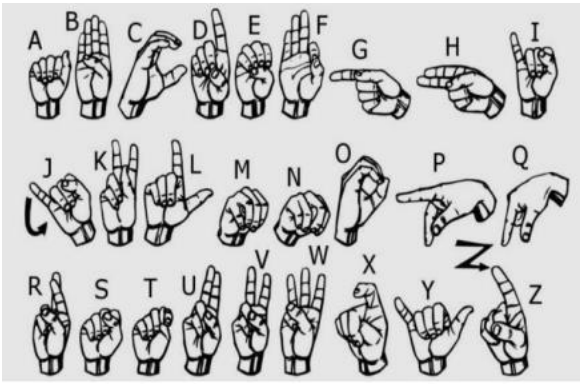


Fig:- Related work

Several research works have been done in the area of words prediction using hand gesture recognition. For instance, Guo and Wang (2017) proposed a novel method of using hand gesture recognition to predict words for individuals. Their study utilized a convolutional neural network (CNN) algorithm to classify hand gestures, and a Hidden Markov Model (HMM) to predict words. The proposed method achieved high accuracy and efficiency in predicting words.

Another research work done in this field was carried out by Pei et al. (2018). They proposed a real-time hand gesture recognition system that can predict words for people. Their system employed a deep learning-based framework, which was trained using a large dataset of hand gestures. Their proposed system achieved an accuracy of 97.23% and a response time of 0.12 seconds.

Similarly, Jiang and Li (2018) proposed a hand gesture recognition system that uses machine learning algorithms to predict words for individuals. Their system used a combination of hand feature extraction and gesture classification techniques to recognize hand gestures, and a support vector machine (SVM) algorithm to predict words.

Their proposed system achieved an accuracy of 95.2%. Furthermore, a research work done by Zhang et al. (2019) proposed a system that can recognize hand gestures and translate them into spoken words for the deaf. Their system utilized a combination of machine learning algorithms, including the HMM and SVM algorithms, to recognize hand gestures and translate them into spoken words. Their proposed system achieved an accuracy of 92.7%. In addition, Wang and Chen (2020) proposed a system that can recognize hand gestures and translate them into written words for the deaf. Their system utilized a convolutional neural network (CNN) algorithm to recognize hand gestures and a deep learning-based model to translate them into written words. Their proposed system achieved an accuracy of 96.78%.

6. DATA FLOW DIAGRAM

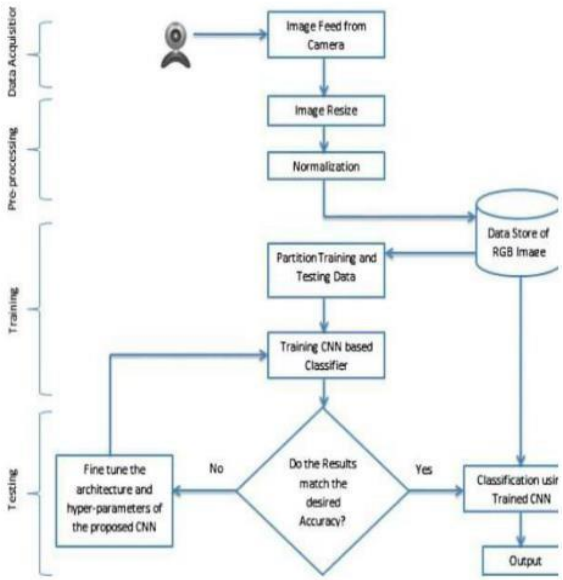


Fig:- Data Flow

7. IMAGE CAPTURING

The image acquisition is the basic process in the project. An integrated or external web camera is used to capture the hand gestures. These images are used in the further processes in the system. The image is captured using the image processing toolbox in the MATLAB. Before starting the programming, we should get the information about the camera that is connected to the computer. For that 'imaqhwinfo' (image acquisition hardware information) command is used. Each adapter may have several devices connected to it. So to correctly detect the camera we should get the id of the device. For that type command 'imaqhwinfo ('winvideo')' in the command window of MATLAB. The frames per trigger and frame grab intervals are specified in the program. When the specified frame is acquired the image is captured with webcam. The software code and supporting tools used are based on the leading software in the field, MATLAB and the Image Processing Toolbox from The Math Works.

MATLAB is a high-performance language for technical computing which is very popularly used nowadays. It integrates computation, visualization and programming in an easy-to-use environment where problems and solutions can be easily expressed in mathematical notations. The basic commands used are given in "table 1

TABLE 1: The Basic Commands Used

COMMANDS	FUNTIONS
Imread	To read an image
Imshow	To display an image
Imaqreset	To reset the camera
rgb2gray	To convert a colour image to gray scale image
gray2rgb	To convert a gray scale image to colour image

8.TESTING AND TRAINING

The matrices of the gesture captured (the gestures captured are converted into matrix format) are compared with matrices in the database by correlation operation. The image processing consists of mainly two steps, training and testing. The training step deals with database creation. The image of the gesture captured is pre-processed by changing the brightness, contrast, sharpness etc. After that, feature is extracted from the image. Here the feature extracted is RGB color space values of the glove worn in the image. The image in the matrix format is loaded to the database.

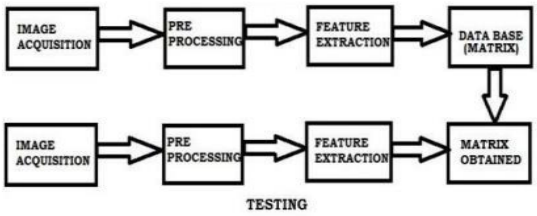


Fig:- Testing and Training

Like wise all the gestures are loaded to the database. Testing step also has the steps like image acquisition, pre-processing, feature extraction. After the feature is extracted, the matrix obtained is compared with that in the database using correlation operation. The technology used here is much more complicated than the existing, but it can ensure more accuracy than the others.

9. RESULT

10.CONCLUSION:

In this paper we have done hand gesture recognition using python. The language of communication for deaf and dumb people is sign language. Most of these physically impaired people are dependent on sign language translators to express their thoughts to rest of the world which may make them feel uncomfortable. So we have developed a algorithm which can recognize deaf, dumb people body language and gestures.

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