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HAND GESTURE RECOGNITION: A SURVEY

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Abstract: *One of the most wonderful gift of nature in our world to the human being to see everything, to listen everything and then reacts to the situations by speaking. But there are some less fortune ones who are deprived of this wonderful gift. That type ofhuman beings are mainly called as "Deaf and Dumb" people. So Howthe "Deaf and Dumb" will communicate with normal people?. Sign language is a language for "Deaf and Dumb" people. By Sign Language, "Deaf and Dumb" people will communicate their feelings Hand gesture is a method of non-verbalcommunication for human beings for its freer expressions much more other than body parts. The "Hand", "Arm", "Eyes", "Lips" and "Face" are the body parts which are using to show the expression.*

Keywords: *Hand gesture recognition, Histogram technique, CNN, HMM, SVM*

1. Introduction

Sign language is the one of the most common and natural method of non-verbal communication between the normal person who have the ability to listen, speak and the deaf & dumb persons who uses their biometric parts like hand and arm movements, face expressions, eyebrow movements to communicate without speaking it. How we come across with mute people communicating with the normal world? The communication between a deaf and normal person is to be a serious problem compared to communication between blind and normal visual people.[6] So the sign language basically in which gestures maid using hands. Handgesture is Interaction between humans like gesture, speech, facial and body expressions. The main advantage of using hand gestures is to interact with computer without touching the interface. It is used as an interface for those people who communicate using sign language. It acts as an interpreter between speaker and hearing people. The communication between deaf and hearing person pose to problem , so that's why Hand gesture technique is used for better communication.

Fig. 1 Indian Sign Language [7]

2. METHODS OF HAND GESTURE

Pixel by Pixel method: In this, the comparison b/w images are done through pixel by pixel. It is easy method but accuracy is not appropriate. Firstly, the background of images are made uniform by Otsu's method. If 's'is the selected threshold and 'I' is the pixel intensity valuethen s=0 if s is less than I and s=255 if s is greater than I.

Edges method: By applying threshold we can find out what part of image has highest gradient value. The magnitude of gradient is equal to the sum of x & y coordinates. To blur the image we can use magnitude filter. The minimum gradient is removed by the threshold.

Using Orientation Histogram: This method depends upon feature vector. The feature vector forms a histogram based on the edges of the image. The system is trained by giving commands. The image is captured by webcam then image is converted into grey scale image to find histogram of the image.The advantage is that it is very fast, robust and translation invariant, and disadvantage is it is rotation dependent.

Thining method: The centre of image is taken to find histogram. The resultant image is gray scale image. Then the image is converted to binary image which is done by Otsu's method. During this method, sometimes noise may also occurs which then is to removed. If the separation b/w end points is less than 15%of the hand, then it is noise and is to be removed. Thus, noise varies distance b/w the end points. With this, the gestures can be recognized.

3. RELATED WORK

[1]VaishaliS.Kulkarni et al. / (IJCSE), 2010: In this, they used histogram technique. They proposed that this technique is only applicable for small sets of ASL alphabtes. They used detectors such as Canny, Sobel etc. to recognize the signs. They suggested that Canny detector is best with 0.25 threshold value.

[2]Noor Adnan Ibraheem, RafiqulZaman Khan, IJCA, 2012: In this, they use various tools and techniques for the recognition of signs. The tools may include HMM, ANN. The signs are recognized on the parameters such as segmentation process, feature extraction and classification algo.

[3]Siddharth S. Rautaray et al., IJU, 2012: They proposed the methods for dynamic applications. These applications includes analysis of complex scientific data, medical training, military simulation, phobia therapy and virtual prototyping. With these applications, the user can interact with virtual objects. These applications provide flexibility to users.

[4]RohitSharma, YashNemani, Sumit Kumar, WCE, 2013: In this, they use 4 techniques for segmentation of sign. Gray level based segmentation yields better result. Rotation and contour features are used to describe ASL alphabets. SVM classifier and k- neighbour techniques are used to evaluate the feature set.

[5]Hsien-I Lin., Ming-Hsiang Hsu, and Wei-Kai Chen, IEEE, 2014: developed a human handgesture recognition system based on CNN. In this, there is no need of model for every gesture using hand features such as fingertips. They also used GMM to increase their performance. They test and train their images and their result avg. proportion was approx. 95.96%. They also states that high level semantic will be used to recognize the images.

4. TECHNIQUES

Histogram technique- It is a method in image processing for the adjustment of contrast using image's histogram. It is the method in which the original image is decomposed into two equal sub images based on its grey level probability density function . The algorithm not only enhance image visual information but also constrain the original image's average luminance.

Convolution Neural Network (CNN): It is a network in which the color of skin is improved and postures of hand is changed to increase accuracies. With the help of CNN, there is no need to develop difficult algorithms. CNN is one of the branches of Neural Network. In CNN, many different features are allowed to identify with different locations.

Support Vector Machines(SVM) : It is the technique used for binary classification . It is to detect a hyper plane which separate different data into different classes. The key point used in SVM is that the higher dimensioning space does not need to be deal directly. SVM' scan be explicitly calculated unlike neural network. SVM also have been extended to solve regression tasks. They are independent of the dimensionality of feature space.

Gaussian Mixture Model(GMM): It is used to derive improved skin color segmentation. These models have small no. of components like kernel ,density. They are mainly used for data clustering. Clusters are assign to maximize the posterior probability. These models uses an iterartive algorithm that converges to local optimum. They are like K-means clustering when cluster have different sizes and relation within them. It is also considerd as soft Clustering method.

Hidden Markov Model(HMM): The main feature of this model is to recognize dynamic gestures. It is mainly known for pattern recognition such as speech,

handwriting gesture, bioinformatics. The goal of HMM is to recover data sequence that is not immediately observable.

Artificial Neural Network (ANN): they are used to estimate functions that depends many inputs and that are usually unknown. It is a system of interconnected neurons which sends and receive messages from each other. These are mostly used in those applications where the complexity of data is not possible manually. They are used in classification such as pattern recognition, novelty detection, blind source separation, robotics etc

5. CONCLUSION

In present, there are various techniques that are used to recognize the hand gestures. In this, I discuss various methods by which we can recognize the signs. The research is going on to recognize the signs accurately.

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