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Translation of Sign Language for Deaf and Dumb People

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Abstract: ***Deaf-mute people can communicate with normal people with help of sign languages. Our project objective is to analyse and translate the sign language that is hand gestures into text and voice. For this process, RealTimeImage made by deaf-mute peopleiscapturedanditisgivenasinput to the pre-processor. Then, feature extraction process by using otsu's algorithm and classification by using SVM(support Vector Machine) can be done. After the text for corresponding sign has been produced. The obtained text is converted into voice with use of MATLAB function. Thus hand gestures made by deaf-mute people has been analysed and translated into text and voice for better communication.***

Keywords: Sign Language, SVM, Text, Voice

I. INTRODUCTION

Communication among deaf-mute people and normal people is more difficult because normal people cannot perceive the speculation and feeling of deaf-mute people. So knowing the various types of sign languages such as sign language for better communication between those people. There are two ways of approach for gesture recognition. In non-vision based approach, sensors such as flex sensor, pressure sensor are used for sign recognition which cannot requires any proper lighting. In vision based approach, Real Time gesture image made by deaf-mute people is taken as input for sign recognition and this requires proper lighting for accurate results.[10] K-mean clustering on captured image, segmenting hand region, feature extraction and image classification are the process involved in this approach to obtain text for corresponding sign.

II. LITERATURE REVIEW

[1] The objective of the paper is building up a framework that takes ongoing pictures as information and yield will be gotten as content and discourse.

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It intends to connect the hindrance by making an application that can change over gesture based communication to voice and give them a communication medium. It is as finger spelling of alphabetic signs will be taken as information and gives the resultant voice yield. Framework utilizes web camera for information and by utilizing Open CV preparing will be done. It helps discourse disabled individuals.

To make a wearable interpreter or a portable device interpreter to perceive gesture based communication and change over to discourse is the future researchhere.

[2]The two types of approach for hand gesture recognition are vision based approach and non-vision based approach. Process such as segmentation, feature extraction and gesture recognition can be performed. High level segmentation is needed for posture recognition to improve the accuracy rate.

[3] Deaf and dumb people find it difficult as they can't find a well-experienced and educated translator at all the time to recognize convey their messages. The only efficient way through which they can communicate is through sign language. The gestures are captured using a webcam and the features are extracted using Scale Invariance Fourier Transform (SIFT). The key features of the captured image is compared with the key features of the images that are already stored and the output is produced in the form oftext.

[4] In this paper image processing and artificial intelligence are used to develop algorithms and many other techniques to ensure independent life for hearing impaired and mute people. It makes them independent as the gestures made by them are captured, recognized and are automatically interpreted by the system. Here we use both the hands to make gestures that represent sign language which is captured as a series of images and MATLAB is used to process it and produce the output in the form of text andspeech.

[5] Natural, modern and innovative way of non-verbal communication can be achieved by using a hand gesture recognition system. The main aim of this paper is to discuss about the novel approach of the hand gesture recognition which is based on detecting the features of the shapes. The system setup comprises of a camera which is used to capture the gesture given by the user and take the image formed as the input to the proposed algorithm. The algorithm is divided into four steps, and they are segmentation, orientation detection, feature extraction and classification. This algorithm need not have any trained sample data as it is independent of user characteristics. 390 images have been tested using the proposed algorithm and the rate of recognition produced is about 92 percent and the average elapsed time is approximately 2.76 sec.

The computation time taken by this algorithm is less when compared with otherapproaches.

III. METHODOLOGY

The Recognition of sign language involves pre-processing level and classification level. Pre-processing level involves gray scale conversion, noise reduction, background subtraction, brightness normalization and scaling operation. [7] Classification levels involves feature extraction using Otsu's algorithm and classification using SVM classifier for gesture recognition.

Table 1. Feature extraction

Feature Name	Values
Width	0.1021
Height	0.1409
Orientation	0.0663
Euler Number	0
Row sum1(55:70)	0.057
Row sum2(140:160)	1.4215
Row sum3(200:220)	1.2241
Column sum1(45:65)	0.0525
Column sum2(120:140)	2.2805
Column sum3(190:210)	0.0211
Standard Deviation	0.0345
Mean	0.4567
Homogenates	0.2345

Real Time gesture made by deaf and mute people is captured in various orientation. This is used as database image. [8] Real time gesture is captured and it is given as input to the pre-processor stage. The color image is converted into gray scale for better classification. Noise can be added to the image and median filter is used to reduce the unwanted noise component and to remove the unwanted background present in image. Then, Features can be extracted from this image using otsu algorithm in the feature extraction process that is shown in table 1. After extracting the features from image, the feature extracted from captured image is compared with feature extracted from stored database image. [9] when it matches, the text and speech for corresponding sign can be obtained that is shown in figure 1.1. Thus, the text and speech for corresponding sign can be obtained with high accuracy rate.

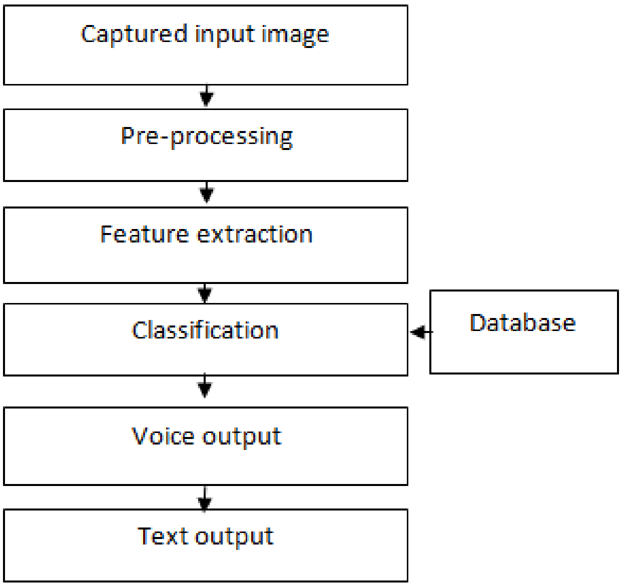

Figure 1.1. Proposed model

IV. RESULTS AND DISCUSSION

The gesture image made by deaf and dumb people is segmented using Otsu algorithm. After the segmentation is done, the database stored is compared with the segmented image taken for testing and the corresponding output will be displayed. Figure 1.2 (a),(c),(e),(g) represents the input gesture images for numbers such as “one”, “three”, “four”, “five” and Figure 1.2 (b),(d),(f),(h) shows the corresponding output for input gesture image which are given below.

Figure 1.2 (a)

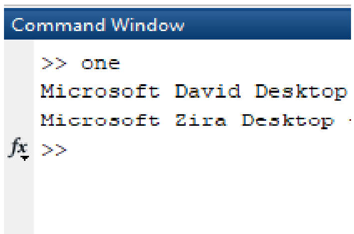

Figure 1.2 (b)

Figure 1.2 (c)

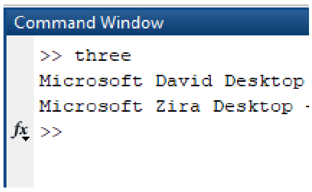

Figure 1.2 (d)

Figure 1.2 (e)

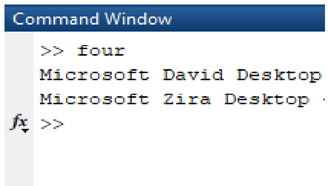

Figure 1.2 (f)

Figure 1.2 (g)

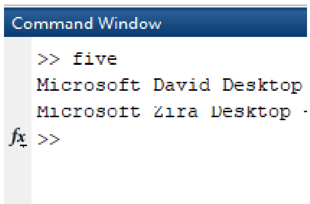

Figure 1.2 (h)

Figure 1.2 (a),(c),(e),(h) are input images
Figure 1.2 (b),(d),(f),(h) are the corresponding outputs

The gesture image made by deaf and dumb people is segmented using Otsu algorithm. After the segmentation is done, the database stored is compared with the segmented image taken for testing and the corresponding output will be displayed.

Figure 1.3(a),(c),(e),(g) represents the input gesture images for Alphabets such as "A", "B", "Y", "J" and Figure 1.3 (b),(d),(f),(h) shows the corresponding output for input gesture image which are given below.

Figure 1.3 (a)

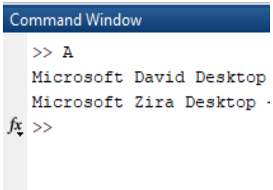

Figure 1.3 (b)

Figure 1.3 (c)

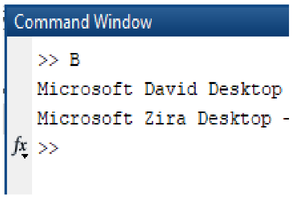

Figure 1.3 (d)

Figure 1.3 (e)

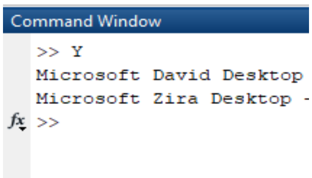

Figure 1.3 (f)

Figure 1.3 (g)

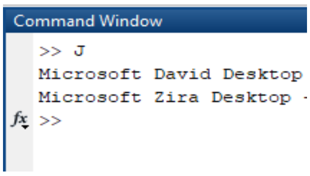

Figure 1.3 (h)

Figure 1.3 (a),(c),(e),(g) are the input images
Figure 1.3 (b),(d),(f),(h) are the corresponding outputs

The gesture image made by deaf and dumb people is segmented using Otsu algorithm. After the segmentation is done, the database stored is compared with the segmented image taken for testing and the corresponding output will be displayed. Figure 1.4 (a),(c),(e),(g) represents the input gesture images for words such as "He", "She", "Okay" and Figure 1.4 (b),(d),(f),(h) shows the corresponding output for input gesture image which are given below.Table 2. shows the 13 sign language recognition rate.

Figure 1.4 (a)

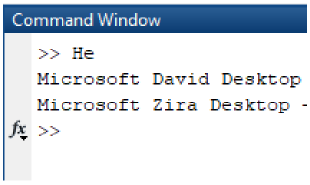

Figure 1.4 (b)

Figure 1.4 (c)

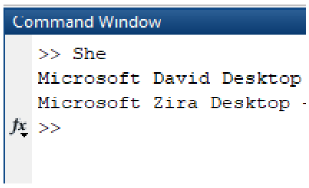

Figure 1.4 (d)

Figure 1.4 (e)

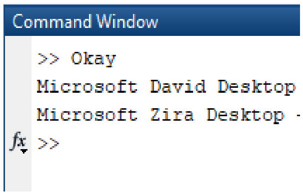

Figure 1.4 (f)

Figure 6.3 (a),(c),(e),(g) are the input images
Figure 6.3 (b),(d),(f),(h) are the corresponding outputs

Table 2. Sign language Recoganization Rate

Sign Language	Accuracy(%)
He	98
She	97
Okay	97
A	94
B	96
Y	94
J	94
1	93
3	97
4	96
5	95

Accuracy of sign language recognization rate of eleven sign was calculated and it was shown in Table2. Thus we obtained an extraordinary accuracy rate for all the above mention sign.

V. CONCLUSION

In this proposed model an attempt has been made to design a system which can recognize the sign language of alphabets and number. 11 different features from image has been extracted to make a feature vector database. SVM and neural network is used for classifying the different sign-language word and hence for recognition. Accuracy of the proposed method for sign language of different language are tested and found to be more than 95 % for most of the signword.

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