

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/339069522>

Translation of Sign Language for Deaf and Dumb People

Article in *International Journal of Recent Technology and Engineering* · January 2020

DOI: 10.35940/ijrte.E6555.018520

CITATION

1

READS

6,984

5 authors, including:



Tamilselvan K.S

KPR Institute of Engineering and Technology

36 PUBLICATIONS 77 CITATIONS

[SEE PROFILE](#)



Suthagar S.

Kongu Engineering College

19 PUBLICATIONS 18 CITATIONS

[SEE PROFILE](#)

Some of the authors of this publication are also working on these related projects:



DC-DC Converter [View project](#)



Android Based Vehicle Speed Control System In Critical Zones Using GPS Technology [View project](#)

Translation of Sign Language for Deaf and Dumb People

Suthagar S., K. S. Tamilselvan, P. Balakumar, B. Rajalakshmi, C. Roshini

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 people is captured and it is given as input 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. 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.

Revised Manuscript Received on December 29, 2019.

Suthagar S, Department of Electronics and Communication Engineering, Kongu Engineering College, Perundurai, Erode, Tamil Nadu, India.

K. S. Tamilselvan, Department of Electronics and Communication Engineering, KPR Institute of Engineering and Technology, Arasur, Coimbatore, Tamil Nadu, India.

P. Balakumar, under graduate scholar of Kongu Engineering College, Perundurai, Erode, Tamilnadu, India.

B. Rajalakshmi, Under Graduate scholar of Kongu Engineering College, Perundurai, Erode, Tamilnadu, India.

C. Roshini, is the under graduate scholar of Kongu Engineering College, Perundurai, Erode, Tamilnadu, India.

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

[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 of text.

[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 and speech.

[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 other approaches.

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.

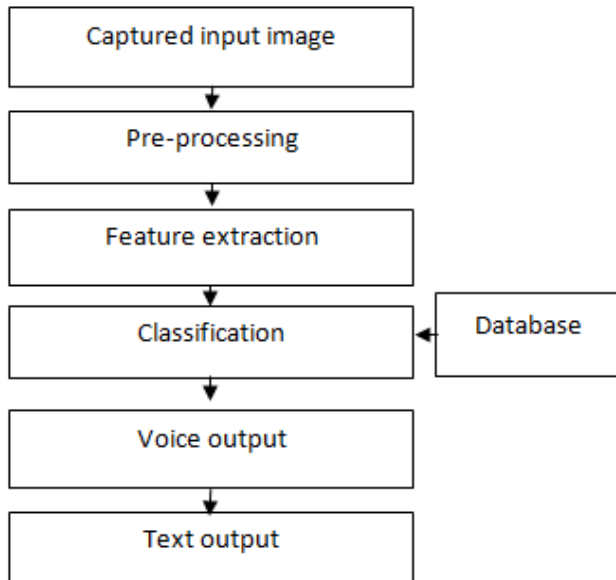


Figure 1.1. Proposed model

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)

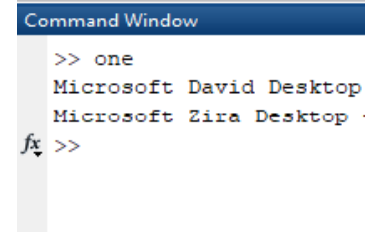


Figure 1.2 (b)



Figure 1.2 (c)

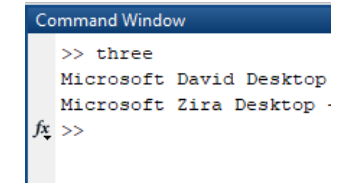


Figure 1.2 (d)



Figure 1.2 (e)

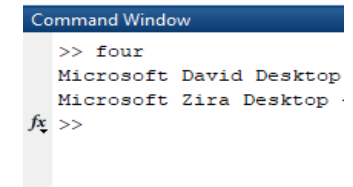


Figure 1.2 (f)



Figure 1.2 (g)

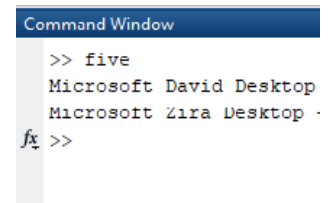


Figure 1.2 (h)

**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)

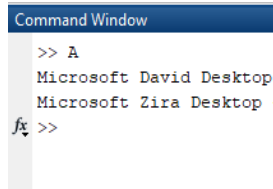


Figure 1.3 (b)

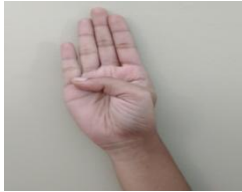


Figure 1.3 (c)

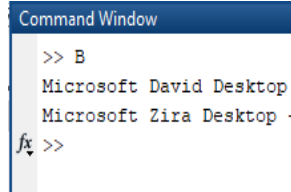


Figure 1.3 (d)



Figure 1.3 (e)

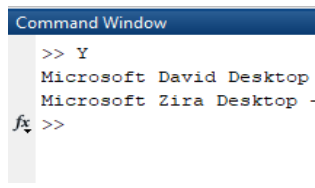


Figure 1.3 (f)



Figure 1.3 (g)

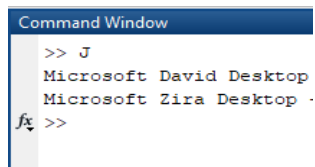


Figure 1.3 (h)

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)

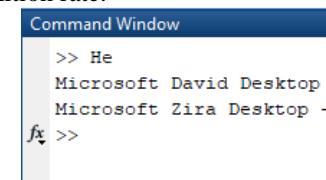


Figure 1.4 (b)



Figure 1.4 (c)

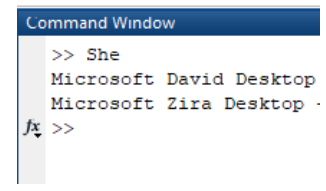


Figure 1.4 (d)



Figure 1.4 (e)

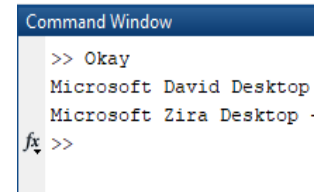


Figure 1.4 (f)

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 Recognition 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 recognition 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.

REFERENCE

1. A. K. Tripathy, D. Jadhav, S. A. Barreto, D. Rasquinha, and S. S. Mathew (2018), "Voice For The Mute," Issue: pp. 2-7.
2. H.Y.Lai and H.J.Lai (2017), "Real-Time Dynamic Hand Gesture Recognition," IEEE Int. Symp. Comput. Consum. Control, Issue :01, pp. 658-661

3. J. S. Sonkusare, N. B. Chopade, R. Sor, and S. L. Tade (2017), "A Review on Hand Gesture Recognition System," Issue: pp. 790- 794.
4. K. K. Dutta, S. A. Swamy (2017), E. Engineering, K. S. Language, I. Introduction, B. Sign, F. S. Language, and J. S. Language, "Double Handed Indian Sign Language to Speech and Text," Issue: pp. 374-377.
5. A. Thorat, V. Satpute, A. ehe, T. Atre, Y. Ngargoje (2016), "Indian Sign Language Recognition System for Deaf People," Int. J. Adv. compt. comm. engg. IJARCCCE, Issue: pp. 5319-5321, 2016.
6. M. Panwar and P. Singh Mehra (2016), "Hand gesture recognition for human computer interaction," IEEE Int. Conf. Image Process, Issue: pp. 1-7.
7. Ruchi Manish Gurav and Premanand K. Kadbe (2016), "Real time Finger Tracking and Contour Detection for Gesture Recognition using OpenCV", International Conference on Industrial Instrumentation and Control (ICIC) College of Engineering Pune, India, Issue: May 28-30.
8. S. N. Sawant (2016), "Sign Language Recognition System to aid Deaf-dumb People Using PCA," vol. 5, Issue: 05, pp. 570-574.
9. Tsung-Han Tsai, Chih-Chi Huang and Kung-Long Zhang, (2017) "Embedded Virtual Mouse System by Using Hand Gesture Recognition," Department of Electronic Engineering, National Central University, Chung-Li, Taiwan, 2017 international Conference on Consumer Electronics-Taiwan (ICCE-TW).
10. Ashish Mhetar, B K Sriroop, Kavya AGS, Ramanath Nayak, Ravikumar Javali and Suma K V (2017), "Virtual Mouse," Proceedings of International Conference on Circuits, Communication, Control and Computing.
11. Suthagar S, Dr. Shaik Meeravali, Sudhakar K, "Performance Comparison of various levels of fusion of Multi-focus image using wavelet" in International Journal of Engineering Research and Technology, Volume 1, Issue 6, August 2012.

AUTHORS PROFILE



Mr. Suthagar S working as an Assistant Professor in Kongu Engineering College, Erode, Tamilnadu India. Completed under Graduation in Electronics and Communication Engineering at Anna University, Chennai and PG in Embedded systems in Jawaharlal Nehru Technological University Hyderabad India. Has about 11 years of experience in teaching in premier Engineering colleges in Tamilnadu and Telangana, India.



Dr. K S Tamilselvan, working as an Associate Professor in KPR Institute of Engineering and Technology, Arasur, Coimbatore, Tamilnadu India. Completed UG in Electronics and Communication Engineering at Anna University, Chennai, PG in Embedded systems in Anna University, Chennai and Ph. D in Anna University Chennai, India. He has about 30 years of experience in teaching in premier Engineering colleges in Tamilnadu, India.



P. Balakumar, is the under graduate scholar of Kongu Engineering College, Perundurai, Erode, Tamilnadu. He is pursuing his UG degree in Electronics and Communication Engineering.



B. Rajalakshmi, the under graduate scholar of Kongu Engineering College, Perundurai, Erode, Tamilnadu. She is pursuing his UG degree in Electronics and Communication Engineering.



C. Roshini, the under graduate scholar of Kongu Engineering College, Perundurai, Erode, Tamilnadu. She is pursuing his UG degree in Electronics and Communication Engineering.