



# International Journal for Innovative Engineering and Management Research

A Peer Reviewed Open Access International Journal

www.ijiemr.org

**COPY RIGHT**



**ELSEVIER**  
**SSRN**

**2021IJIEMR.** Personal use of this material is permitted. Permission from IJIEMR must be obtained for all other uses, in any current or future media, including reprinting/republishing this material for advertising or promotional purposes, creating new collective works, for resale or redistribution to servers or lists, or reuse of any copyrighted component of this work in other works. No Reprint should be done to this paper, all copy right is authenticated to Paper Authors

IJIEMR Transactions, online available on 17th Sept 2021. Link

[:http://www.ijiemr.org/downloads.php?vol=Volume-10&issue=ISSUE-09](http://www.ijiemr.org/downloads.php?vol=Volume-10&issue=ISSUE-09)

**DOI: 10.48047/IJIEMR/V10/I09/15**

Title **Conversation Engine for Deaf and Dumb**

Volume 10, Issue 09, Pages: 107-112

Paper Authors

**Para Upendar, A.Sangeetha, P. Ravindra**



USE THIS BARCODE TO ACCESS YOUR ONLINE PAPER

To Secure Your Paper As Per **UGC Guidelines** We Are Providing A Electronic Bar Code

## Conversation Engine for Deaf and Dumb

### <sup>1</sup>Para Upendar

Assoc Professor  
Department of Cyber Security  
MLR Institute of Technology  
Hyderabad, India  
upendar.para@gmail.com

### <sup>2</sup>A.Sangeetha

Assistant Professor  
Department of CSE  
MLR Institute of Technology  
Hyderabad, India  
allamsangeetha@gmail.com

### <sup>3</sup>P. Ravindra

Assistant Professor  
Department of CSE  
Matrusri Engineering College  
Hyderabad, India  
ravindragec539@gmail.com

**Abstract** ---There are a lot of people who have many disabilities in our world out of which, people who are deaf and dumb cannot convey their messages to the normal people. Conversation becomes very difficult for this people. Deaf people cannot understand and hear what normal people is going to convey, similarly dumb people need to convey their message using sign languages where normal people cannot understand unless he/she knows or understands the sign language. This brings to a need of an application which can be useful for having conversation between deaf, dumb and normal people. Here we are using hand gestures of Indian sign language (ISL) which contain all the alphabets and 0-9 digit gestures. The dataset of alphabets and digits is created by us. After dataset building we extracted the features using bag-of-words and image preprocessing. With the feature extraction, histograms are generated which maps alphabets to images. Finally, these features are fed to the supervised machine learning model to predict the gesture/sign. We did also use CNN model for training the model.

**Keywords** ---- Gestures, Image Processing, Bag of words, Clustering, Classification, Convolutional neural network.

### I. INTRODUCTION

Gestures are used for conversation between deaf, dumb and normal person. Communication is the very important in order to convey any kind of information, messages with good understanding. It really becomes very difficult for disabled people like deaf and dumb to convey their messages. They take help from sign languages to convey their messages. But normal people cannot understand the sign language. Deaf and dumb take help of sign language to convey messages. There are many sign languages in the world, every country has their own sign language.

The Main Goal of our project is to fill the bridge between deaf, dumb and normal people with using Indian sign language. We are using only

alphabets and digits in our project but can be easily extended to words and sentences very easily and help the deaf-dumb community.

#### 1.1 Objectives

- To make communication easy between normal and disabled person.
- Education can be made easier using this application or conversation engine.
- This engine or application takes the gestures (live feed) as input and outputs result on the screen along with the speech which makes much more understandable.

- This is a much cheaper and easier solution to serve the community.

## I. LITERATURE SURVEY

There are many proposed systems that have been proposed prior.

There are many papers which have the same idea and did implement in many different ways with different techniques

There is a technique which has been mentioned in paper [7]. In this paper they took images using MATLAB. They used Indian sign language for classification. It has been compared and analysed by using SIFT features using SIFT algorithm, keypoint localization and keypoint descriptor. After SIFT algorithm, we'll get keypoints which symbolize or represent a sign.

Many other methods have been used prior. Many machine learning algorithms have been used upon the keypoints which are mapped by SIFT. Features of the sign language are extracted and these features are used to train the machine learning model with many classification algorithms.

Lots of techniques are also introduced in paper [8]. They used gloves over here. In order to get signal of the hand they used many calculations and techniques. Movements or hand gestures are tracked or recorded well. Basically this is the Glove based approach.

Another technique which is used is dataset collection by capturing and saving the images in the folder and next using basic CNN architecture to train the model and use openCV to provide live feed and could capture the gestures in real time.

## I. PROPOSED SYSTEM

We did use classification machine learning and also CNN model for gesture recognition. Our proposed system has many steps involved which are Dataset building / images collection,

Preprocessing of image which includes segmentation, feature extraction and classification using Support vector machines (SVM) and CNN model which is shown in figure 1.

### Dataset Collection

There's a lot of research in this field so there are very less datasets available for training the model. We did get Indian sign language dataset but then they are all not that good, so we built our own dataset. Our dataset has total of 35 classes. Each of 1200 images. All of these images are captured using webcam and we removed background noise by capturing each image with black background.

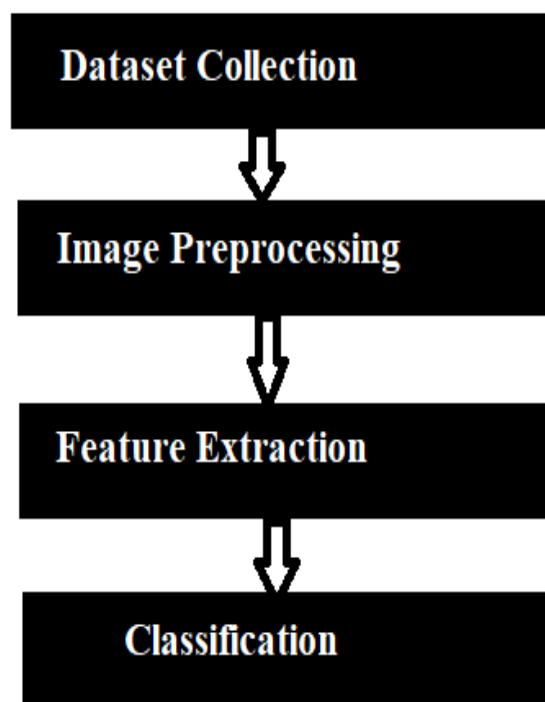


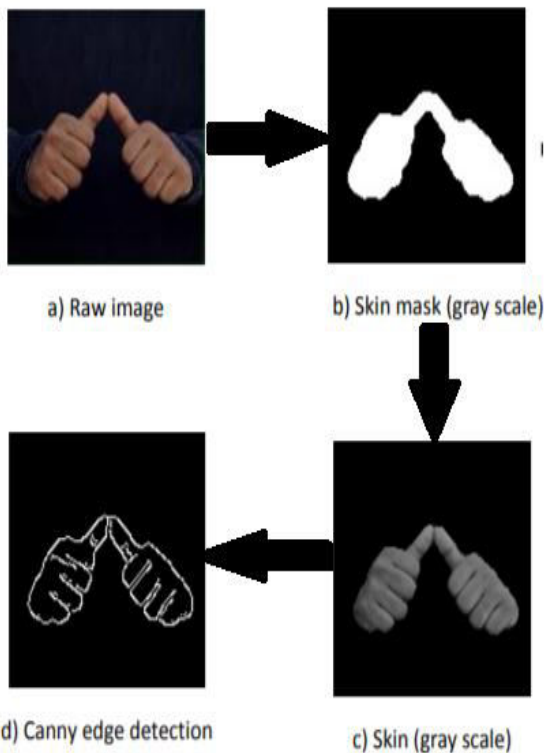
Fig 1 : Overview

### Image Preprocessing

Here all the images are preprocessed so as to make this used for feature extraction. In this we do image segmentation and edge detection. We'll use skin masking techniques to segment

the images an later use canny edge detection for detecting the edges.

Fig2: Image Preprocessing



### Feature Extraction

In this step , we'll perform image feature detection, clustering and generate code book using bag of words model. Initially we'll be using SURF novel technique for feature extraction.

Next we'll cluster or divide all these SURF features in order to make or create a visual vocabulary which is useful. For clustering we will be using K-means clustering. It clusters similar features into a bag. Using this, for every word , we can predict visual words then.

Next histograms are been calculated using visual words which are been predicted. This is calculated by taking the frequency or count of every word that belongs to a certain image.



Fig 3: SURF points for an image

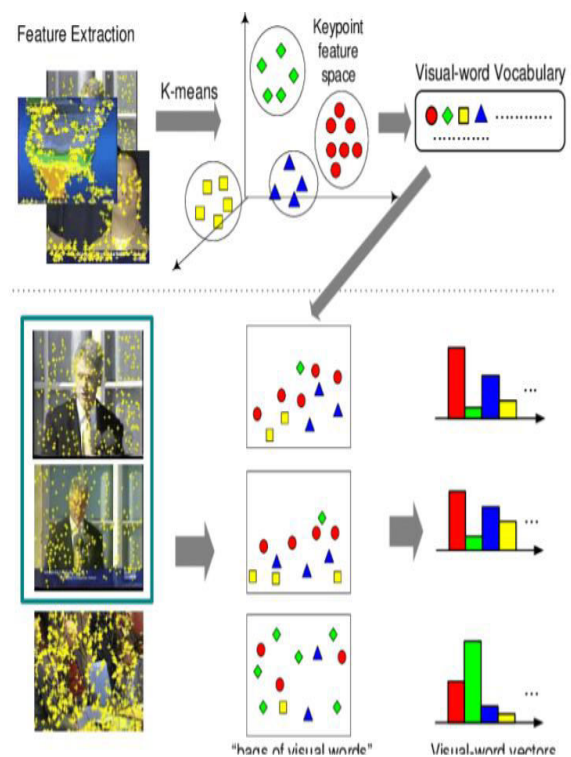


Fig 4 : BOW visual words.

Histograms generation for each image and use of K-means for clustering.

### Classification

Once all the histograms are created,then we'll have to use a model for training a model. We are using Support Vector Machines (SVM) and CNN model for training a model.

CNN model :

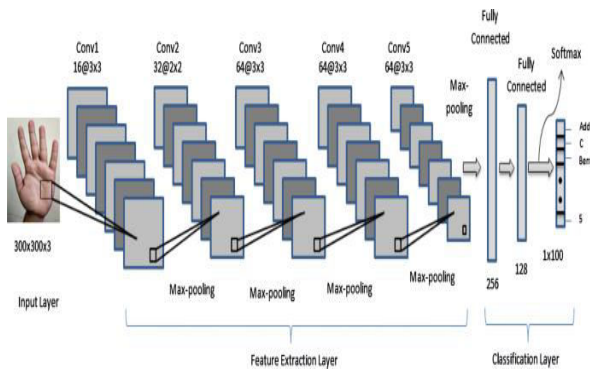


Fig 5: CNN architecture

## II. RESULTS

### 1) SVM

Using SVM and bag of words model we got 99% accuracy.

Accuracy : 99%

Precision : 99%

F1 score : 99%

Recall : 99%

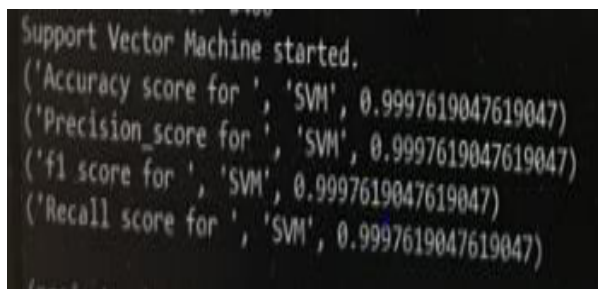


Fig 6: SVM performance metrics

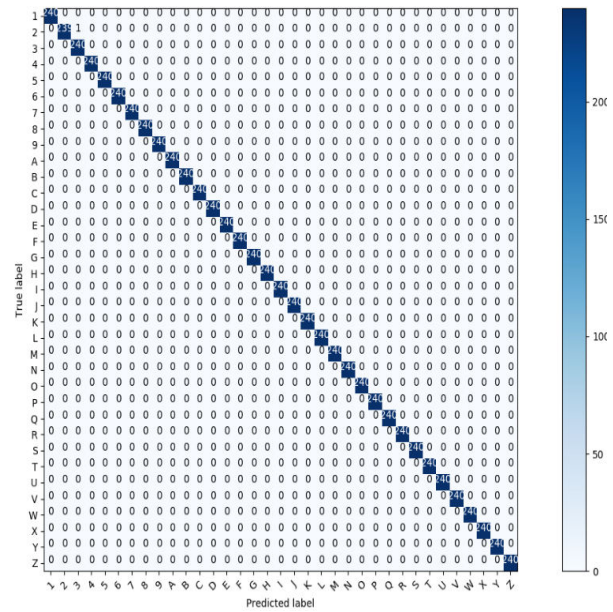


Fig 7: Confusion Matrix

### 2) CNN

Accuracy : 75-80%

We got this accuracy after performing upto 150 epochs.

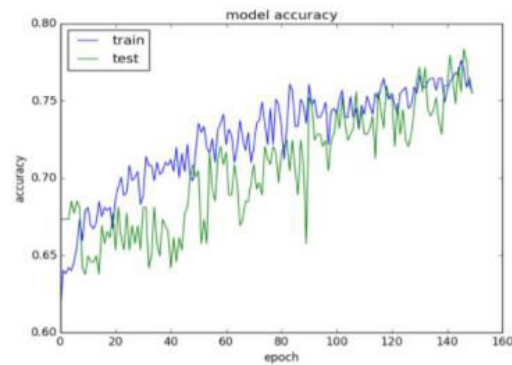
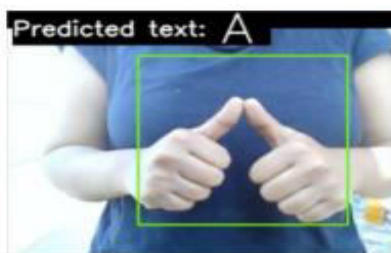


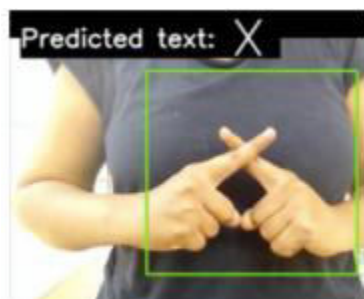
Fig 8 : epochs vs accuracy



a) Alphabet A



b) Alphabet H



c) Alphabet X

## V. FUTURE WORK

Basically we did use a ML approach having bag of words. And also basic CNN model and achieved a stable accuracy, but we are thinking of using a complex and better CNN architecture so that the accuracy can be in 99%. And we 'll also include speech as output and build a better UI which can be used in real time and also can be improved for words and even sentences

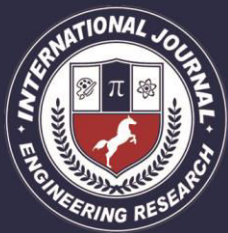
## VI. CONCLUSION

In This Paper , we did use a bag of words model and classification technique support vector

machine and also basic CNN model also. This can be used in real time for disabled persons to communicate effectively with the normal people and vise versa.

## VII. REFERENCES

1. S. C. Agrawal, A. S. Jalal, and C. Bhatnagar. Recognition of ISL language using feature fusion., 2012 4th International Conference on Intelligent Human Computer Interaction (IHCI), pages 1–5, 2012.
2. Herbert Bay, TinneTuytelaars, and Luc Van Gool. Surf: Speeded up robust features. In Ale'sLeonardis, Horst Bischof, and Axel Pinz, editors, Computer Vision – ECCV 2006, pages 404–417, Berlin, Heidelberg, 2006. Springer Berlin Heidelberg.
3. Shanu Sharma, Sakshi Goyal, Ishita Sharma, "Sign Language Recognition System For Deaf And Dumb People", in IJERT, pp. 2278- 0181, vol. 2 Issue 4, 2013.
4. B. Gupta, P. Shukla, and A. Mittal. K-nearest correlated neighbor classification for Indian sign language gesture recognition using feature fusion. In 2016 International Conference on Computer Communication and Informatics (ICCCI), pages 1–5, 2016.
5. Yu-Gang Jiang, Jun Yang, Chong-Wah Ngo, and Alexander Hauptmann. Representations of keypoint-based semantic concept detection: A comprehensive study. Multimedia, IEEE Transactions on, 12:42 – 53, 02 2010
6. Dutta, Kusumika & K, Satheesh & S, Anil & Sunny, Breeze. (2015). Double handed Indian Sign Language to speech and text. 374- 377. 10.1109/ICIIP.2015.7414799.
7. Shanu Sharma, Sakshi Goyal, Ishita



- Sharma, "Sign Language Recognition System For Deaf And Dumb People", in IJERT, pp. 2278- 0181, vol. 2 Issue 4, 2013.
8. Swapnil Chandel, Mrs. Akanksha Awasthi, "Hand Gesture Recognition For Sign Language Recognition: A Review", in IJSTE, vol. 2 Issue 10, pp. 2349-784X, Apr 2016.
  9. Vasudhevarreddy N., Haribabu K., Prasad S.V.S., Khalandar Basha D, "A novel image cryptography using nearest prime pixel algorithm "
  10. G.SusmithaValli "Scalar Vs Vector Color Image Processing :An analysis" JARDCS Issue No:7 Special;ISSN No:1943-023X 2018
  11. N. Chandra Sekhar Reddy , Vemuri P,Govardhan A"An emperical study on support vector machines for intrusion detection"-International Journal of Emerging Trends in Engineering Research (2019)