



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

# IJRSET

International Journal of Innovative Research in  
**SCIENCE | ENGINEERING | TECHNOLOGY**

# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 10, Issue 12, December 2021

**ISSN** INTERNATIONAL  
STANDARD  
SERIAL  
NUMBER  
INDIA

Impact Factor: 7.569

9940 572 462

6381 907 438

[ijirset@gmail.com](mailto:ijirset@gmail.com)

[www.ijirset.com](http://www.ijirset.com)



# Sign Language Recognition Using Machine Learning

Rishabh Sharma<sup>1</sup>, Shivam Garg<sup>2</sup>, Anmol Joshi<sup>3</sup>, Lokesh Kumar<sup>4</sup>, Isha Gupta<sup>5</sup>

Students, Dept. of Computer Science and Engineering, HMR Institute of Technology and Management, Hamidpur,  
New Delhi, India<sup>1,2,3,4</sup>

Assistant Professor, Dept. of Computer Science and Engineering, HMR Institute of Technology and Management,  
Hamidpur, New Delhi, India<sup>5</sup>

**ABSTRACT:** Dumb people are frequently denied access to normal communication with other members of society. The system's goal is to recognize sign language and convert it to text in the local language. The purpose of this research is to develop a neural network that can identify which letter of the alphabet is being signed from a photograph of a signing hand. This project is the initial step toward creating a sign language translator that can turn sign language messages into written language. Many deaf and dumb individuals would greatly benefit from such a translator, since it would make conversing with others in ordinary situations much easier for them. The deaf community's experience of isolation motivates this goal even more. Loneliness and sadness are more common among deaf people, particularly when they work in a hearing environment. Sign language is a fascinating computer vision challenge that is also highly beneficial for deaf people who want to communicate with people who don't understand it. We want to solve this problem, but instead of using high-end technology like gloves or the Kinect, we want to recognize gestures from images (which can be obtained from a webcam, for example), and then use computer vision and machine learning techniques to extract relevant features and classify them. To begin, we created a data set that included the various hand movements of the sign language alphabet that we wanted to identify. The next stage was to segment out only the hand region of each image and utilize this data for feature learning, then train a classifier to determine which letter was being displayed.

**KEYWORDS:** MSW, DOF,GSU

## I. INTRODUCTION

Communication is one of the most essential prerequisites for societal life. Deaf and dumb people communicate via sign language, but non-deaf and dumb people have a hard time understanding them. Despite much research on the recognition of American sign language, Indian sign language is vastly different from American sign language. ISL uses two hands to communicate 20 times out of 26 times, whereas ASL uses only one hand. When utilizing both hands, features are typically concealed due to the overlapping of hands. Furthermore, a lack of datasets, combined with regional differences in sign language, has hampered ISL gesture detection efforts. Our effort aims to be the first to embrace Indian sign language in order to overcome the communication gap between hearing and deaf people. The effective application of this technology to words and common phrases may not only make it easier for deaf and dumb people to communicate with the outside world, but it may also aid in the creation of autonomous systems that can comprehend and support them. Sign language is an interesting computer vision task that is also incredibly helpful for deaf people who want to communicate with people who do not understand it. To begin, we constructed a data set with the various sign language alphabet hand motions that we intended to recognize. The next step was to segment out only the hand region of each image and use this data for feature learning, after which a classifier was trained to determine which letter was displayed.

### 1.1 Problem Statement

Dumb people use hand signs to communicate, hence normal people face problem in recognizing their language by signs made. Hence there is a need of the systems which recognizes the different signs and conveys the information to the normal people. The need of this project came into picture with increasing no. of people having hearing and oral disorders.



### 1.2 Aim

The objective of this project is to identify the symbolic expression through images so that the communication gap between the normal and hearing-impaired person can be easily bridged. As communication is always having a great impact in every domain and how it is considered the meaning of thoughts and expression that attract researchers to bridge this gap for every living being.

### 1.3 Literature Survey

Extensive classification of communication methods used by deaf people - Wearable Communication Device and Online Learning System. Below the wearable communication system, there is a Glove-based system, keypad mode and Handicom Touch-screen. All of the above three-dimensional methods use a variety of sensors, an accelerometer, a small right controller, a text to translate speech, a keypad and a touch-screen. The need for an external device to translate the message between deaf-mute and deaf-deaf people can be overcome by a second method namely an online learning program.

### Limitations of Existing System

- One of the biggest problems with the existing system is that a mute person should always carry Hardware.
- The user cannot perform other functions with the flexible sensor on the fingers and the sensors must be kept upright.
- The controller may assume that the user provides command and can eventually lead to unwanted outcomes and health under hardware.

## II. TECHNOLOGY USED

We are using Python, NumPy, OpenCV, Keras, TensorFlow, React, IDE Used – Notebook and Visual Studio Code. The specifications of all the technologies used are enlisted one by one in detail in the following subsection.

### 2.1 Keras

Keras is an open-source software library that provides a Python interface for artificial neural networks. Keras acts as an interface for the TensorFlow library.

### 2.2 Python

Python is a high-level programming language translated into high-level translations. Its design philosophy emphasizes the readability of the code through its use of critical precision. Its language is structured and its object-oriented approach aims to assist editors in writing clear, logical code for small and large projects.

### 2.3 OpenCV

OpenCV (Open-Source Computer Vision Library) is a library of program functions primarily aimed at real-time computer vision. Or the Library is a platform and free to use under the open-source Apache 2 License.

### 2.4 Numpy

NumPy is a Python programming language library, adding support for multiple, multi-layered and mathematical editing, as well as a large collection of high-level mathematical functions running on these arrays.

### 2.5 TensorFlow

TensorFlow is a free and open-source software library for machine learning and artificial intelligence. It can be used for a wide range of activities but is more focused on training and pursuing deep neural networks. TensorFlow is a symbolic mathematical library based on data flow and split systems.

### 2.6 React

React is a free and open-source JavaScript library for building user connections or UI objects. Hosted by Facebook and the community of individual developers and companies. React can be used as a basis for building single-page programs or mobile applications.



### III. PROPOSED METHODOLOGY

- Creating the dataset:** We had been having a lived feed from the video cam and every frame that detects a hand in the ROI (Region of Interest) created had been saved in a directory. Creating dataset was the main part of project because the performance of project depends on how clean our dataset is. We had to create a separate environment in anaconda navigator to implement a convolutional neural network. For this we created a tensor flowed environment in anaconda navigator and implement a CNN model. Now the next stepped was to train our CNN model with training dataset and test the model to calculate the performance level.
- Training CNN:** now on the created data set, we trained a CNN. We load the data which we could use the flowed from directory function to load the train and test set data. Now for creating the dataset we got the lived cam feed used OpenCV and created an ROI that was nothing but the part of the frame where we wanted to detect the handed in for the gestures. The red box was the ROI and this window was for getting the lived cam feed from the webcam.
- For differentiating between the background, we calculated the accumulated weighted average for the background and then subtract this from the frames that contain some objected in front of the background that could be distinguished as foreground. This was done by calculating the accumulated weight for some frames (here for 60 frames) we calculate the accumulated average for the background.
- Predicting the gesture:** We created a bounding box for detecting the ROI and calculate the accumulated average as we did in creating the dataset. This was done for identifying any foreground objected. We used CNN for image classification because image classification involves the extraction of features from the image to observe some patterns in the dataset. Used an ANN for the purpose of image classification would end up being very costly in terms of computation since the trainable parameters became extremely large.
- Now we designed the CNN depending upon some trial-and-error other hyperparameters could been used. After that we fit the model and save the model (model\_for\_gesture. py) for it have been used later.

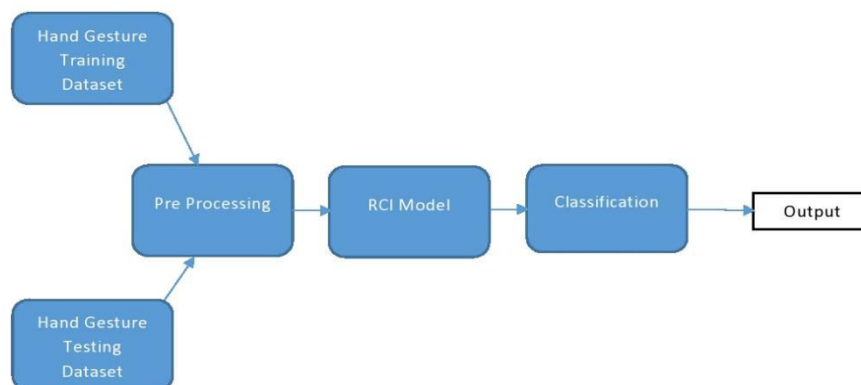


Figure 1: Block Diagram

### IV. CONCLUSION

We have successfully completed this project which identifies letters of Indian Sign Language based on appropriate gestures. We solved this problem without employing high-end tools like gloves or Kinect for gesture recognition. We took a different approach. We wanted to identify people from photographs (such as those captured by a camera), and then use computer vision and machine learning techniques to extract and classify key features. Since it is difficult to communicate with people with hearing disabilities. Deaf and dumb people communicate through sign language with hand gestures, making it difficult for non-deaf and mute people to understand their language. As a result, we created a project that recognizes various indicators and communicates information to the general public.

### V. EXPERIMENTAL RESULTS

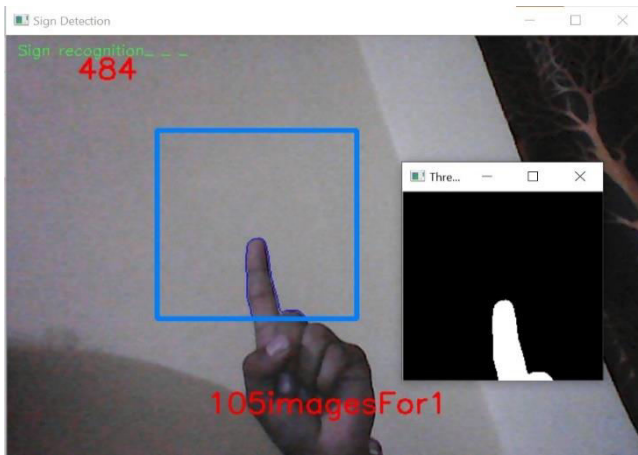


Figure 2: Result1

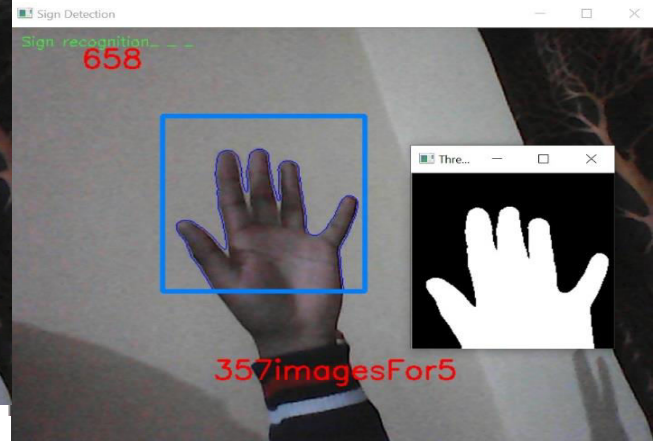


Figure 4: Result3

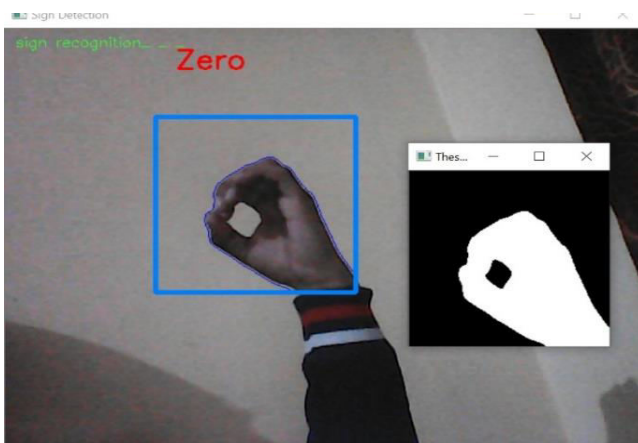


Figure3: Result2

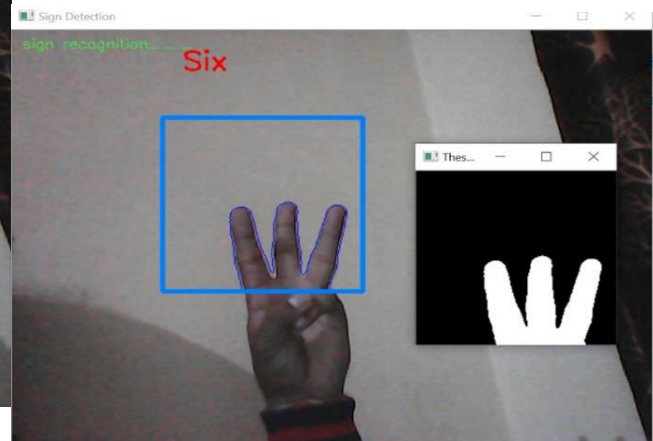


Figure 5: Result4

### REFERENCES

1. Sign Language and Gesture Recognition for Deaf and Dumb People, Hema B N, Sania Anjum, Umme Hani, Vanaja P, Akshath.
2. [https://en.wikipedia.org/wiki/Sign\\_language](https://en.wikipedia.org/wiki/Sign_language)
3. P.S Rajan and Balakrishnan G, Real time Indian Sign language recognition system to aid deaf dumb people, IEEE 13th International Conference on Communication Technologies, 2011, pp 737-742.
4. Indian Sign Language Recognition based on histograms of Oriented Gradient, Neha V. Tavari, Prof. A. V. Deorankar.



Impact Factor:  
7.569



# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 9940 572 462  6381 907 438  [ijirset@gmail.com](mailto:ijirset@gmail.com)



[www.ijirset.com](http://www.ijirset.com)

Scan to save the contact details