

Deep Learning Based Sign Language Recognition for English and Marathi Language

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Abstract: In our daily life language play an important role to communicate with each other. To express the feeling and emotions we use languages. The voice of human has different attribute such as speed, vocal, pitch, resonance, rhythm, tone, etc. which is helpful to express the feeling of human. But the people who are dumb and deaf they are unable to communicate with normal people due to language barrier. Deaf and dumb people use sign language to express their thought. Generally normal people not understand the sign language. Sign language is the only tool of communication for the person who is not able to speak and hear anything. Sign language is a boon for the physically challenged people to express their thoughts and emotion. In this work, a novel scheme of sign language recognition has been proposed for identifying the alphabets and gestures in sign language. With the help of computer vision and neural networks we can detect the signs and give the respective text output.

Keywords: Sign Language Recognition, Convolution Neural Network, LR, Image Processing, Hand Gesture Recognition, text and voice output

I. INTRODUCTION

A sign language is a way of communicating by using the hands and other parts of the body. According to the World Health Organization, there are around 466 million people worldwide have disabling hearing loss, who often use sign language for communication. Sign languages differ from country to country. ASL is expressed by movements of the hands and face, and is the primary language of North Americans who have disabling hearing loss. Still, there will be problems when these people try to communicate with ordinary people who are unfamiliar with ASL. As a result, an automatic and real-time sign language interpreter is not only necessary, but also in high demand for the people with and without hearing loss alike [1].

The objective of this system, is to identify a low cost, affordable method that can facilitate hearing and speech impaired people to communicate with the world in more comfortable way where they can easily get what they need from the society and also can contribute to the well-being of the society. Another expectation is to use the research outcome as a learning tool of sign language where learners can practice signs [3].

II. LITERATURE SURVEY

S. Chavan, X. Yu and J. Saniie, "Convolutional Neural Network Hand Gesture Recognition for American Sign Language," 2021 IEEE International Conference on Electro Information Technology (EIT), 2021, pp. 188-192, doi: 10.1109/EIT51626.2021.9491897 in this paper the Selected CNN architecture gives recognition test accuracy of 87.5%. The image preprocessing on the database helps reduce the computational and storage complexity. CNN consists of four layers each having different filter sizes which improve speed and Accuracy [1].

M. M. Hasan, A. Y. Srizon, A. Sayeed and M. A. M. Hasan, "Classification of Sign Language Characters by Applying a Deep Convolutional Neural Network," 2020 2nd International Conference on Advanced Information and Communication Technology (ICAICT), 2020, pp. 434-438, doi: 10.1109/ICAICT51780.2020.9333456. In this paper the Sign Language MNIST dataset of American sign language and proposed a deep convolutional neural network and calculated the overall test accuracy. After implementing the model, they produced an overall accuracy of 97.62% [2].

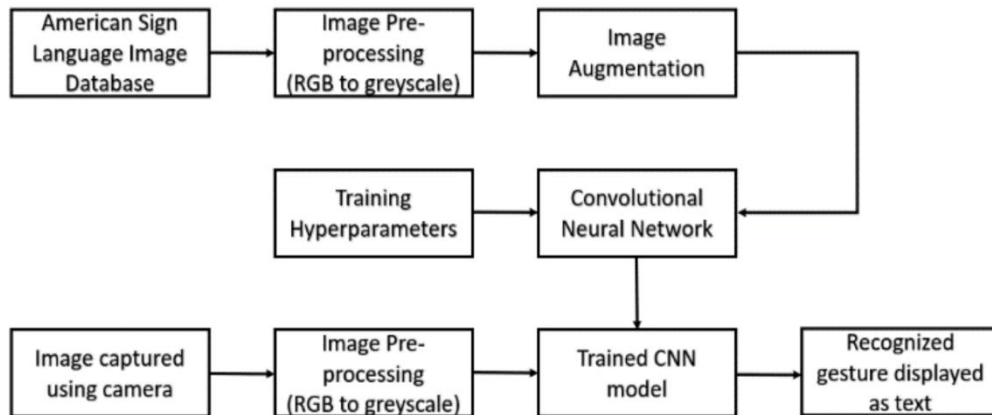


Figure 1: System block Diagram [1].

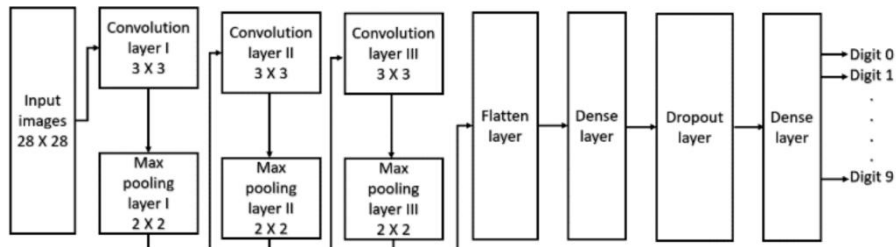


Figure 2: Selected CNN Architecture with 10 layers [1]

D. N. Nagesh Kumar, M. Madhukar, A. Prabhakara, A. V. Marathe, Manoj and S. S. Bharadwaj, "Sign Language to Speech Conversion — An Assistive System for Speech Impaired," 2019 1st International Conference on Advanced Technologies in Intelligent Control, Environment, Computing & Communication Engineering (ICATIECE), 2019, pp. 272-275, doi: 10.1109/ICATIECE45860.2019.9063849. In this paper, Read the image Convert from RGB Color Model to HSV Color Model, the image converted from the RGB to HSV. Detect the sign based on the position which is detecting the head and hands using pixel values around the head and hands. Transmit the sign to the Bluetooth receiver for the audio to play [3].

K. Sohelrana, S. F. Ahmed, S. Sameer and O. Ashok, "A Review on Smart Gloves to Convert Sign to Speech for Mute Community," 2020 8th International Conference on Reliability, Infocom Technologies and Optimization (Trends and Future Directions) (ICRITO), 2020, pp. 1262-1264, doi: 10.1109/ICRITO48877.2020.9197947. In this paper, by using the smart gloves and flex sensor gesture recognition take place where PCA is used to minimize dimensionality of image. his system design and implementation of smart glove will help speech-impaired persons to express their feelings in voice. In this project, Flex Sensor plays a big role. The hand glove is stitch with the flex sensors. [4]

M. M. Chandra, S. Rajkumar and L. S. Kumar, "Sign Languages to Speech Conversion Prototype using the SVM Classifier," TENCON 2019 - 2019 IEEE Region 10 Conference (TENCON), 2019, pp. 1803-1807, doi: 10.1109/TENCON.2019.8929356. In this paper, only one glove is designed, such that only gestures from a single hand can be sensed. But, ASL and ISL gestures consist both one hand and two hand gestures, so single glove cannot be sufficient to make all sign language gestures. [5]

2.1 Comparison between Literature Papers

Features	[1]	[2]	[3]	[4]
Purpose	Boosted the training accuracy and testing accuracy.	Achieve the successful identification of the sign linguistics alphabets.	Reduce communication gap between normal people and deaf-dumb people.	Normal peoples also can understand disable person.
Algorithm	Convolutional Neural Network.	Sign language MINST dataset and CNN.	HSV Color Model	PCA

Focus on	Accuracy	Better results.	Making it more user friendly, efficient, portable, compatible for more signs and as well as dynamic signs.	Device will be more reliable and user friendly
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III. PROPOSED SYSTEM

As we know that during all Sign language recognition accuracy is main factor which is matter for the user when use the system. With the help of CNN, we have great advantage of recognize sign with good accuracy. This will help to overcome the requirement of a translator since real time conversion is used. The system acts a voice of the person who is deaf-mute. This project is a step towards helping a specially challenged people. This can be further enhanced by making it more user friendly, efficient, portable, compatible for more signs and as well as dynamic signs. Since the main motive of our project to add regional language which is Marathi. Implementing a system for English as well as marathi language.

IV. CONCLUSION

From this all paper we studied that accuracy is main factor which affect in sign language recognition system which is previously made by other people. It's all about using different types of algorithm to increase efficiency of system. For better accuracy we using CNN algorithm for English and LR for marathi language. This overcomes the requirement of a translator since real time conversion is used. The system acts a voice of the person who is deaf-mute. This project is a step towards helping a specially challenged people. This can be further enhanced by making it more user friendly, efficient, portable, compatible for more signs and as well as dynamic signs

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