



## Survey on Indian Sign Language Recognition Systems

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### ABSTRACT:-

Sign Language is a way of communication used by hearing-impaired people. As many normal people don't know the Sign Language it is difficult to understand by them to understand thus, increasing the communication gap between normal and hearing-impaired people. To overcome this problem many systems, using Machine Learning (ML), Artificial Intelligence (AI), Deep Learning (DL), computer vision methods, were developed and being developed. These systems are used to translate Indian Sign Language (ISL) to understandable text, facilitating the communication between normal and hearing-impaired people. This study briefly explains various types of Indian Sign Language (ISL) recognition systems.

### 1. INTRODUCTION:-

Indian Sign Language (ISL) recognition system is a model to recognize static or dynamic hand gestures of Indian Sign Language (ISL) using machine learning, Convolutional Neural Networks (CNN), Artificial Neural Networks (ANN), Recurrent Neural Network (RNN) algorithms. These systems also use trending techniques like computer vision, Image Processing and Video Processing. There are many models proposed to recognize Indian Sign Language (ISL) but not as many as models proposed to recognize American Sign Language (ASL). ISL is such a field where much more research can be done. Many models that are proposed till today were only able to recognize some set of words or sentences, such models can be improved in future. This is mainly due to the unavailability of standard dataset, which consists of almost every word and can be used by the models, for Indian Sign Language (ISL). Many models proposed created their own dataset of a set of words and sentences.

Some datasets were created after a while containing the videos of words of different words.

One such dataset is Indian Lexicon Sign Language Dataset-INCLUDE containing of several hundred videos of 263 different word signs made by experienced trainers. A subset of INCLUDE is INCLUDE-50 containing 50 different words for easy testing of the recognition model.

In this paper we will know about some of the models proposed for Indian Sign Language recognition.

### 2. LITERATURE SURVEY

[1] M.K. Bhuyan proposed a model for dynamic hand gesture recognition system which incorporated the development of Sign Language Recognition Systems. This system is proposed for effective communication between computer and human.

[2] Tripathi, Neha and Nandi proposed a model for Indian Sign Language (ISL) recognition which recognizes and classifies 10 different sentences using orientation histogram along with Principal Component Analysis (PCA). This system also classifies gestures made by both the hands. The results obtained by this model is tested by several parameters such as Euclidean distance, Mahalanobis distance, City block distance, Chessboard distance, Cosine distance, Correlation distance. This model obtained maximum accuracy of classification with Euclidean distance and Correlation distance. The dataset used for this model is self created.

[3] Nath and Arun developed a system for Sign Language Recognition of numbers and alphabets using ARM CORTEX A8 processing board and OpenCV software tool. They claimed that this system can also be used as a means to learn sign language.

[4] Muthu Marippan and Gomathi developed a system of India Sign Language (ISL) recognition with their own dataset consisting of 80 different words and 50 different sentences recorded with 10 different signers. The model is trained using 8 samples of each word while 2 samples are used for testing. The words are predicted using Fuzzy c-means clustering. This model obtained an accuracy of 75% of 40 different words. They are planned on improving the system by combining the Convolutional Neural Networks (CNN) and Recurrent Neural Networks (RNN). They are also planning on more words to the system.

[5] Mistree Kinjal worked on a system that translates videos of Indian Sign Language (ISL) into text for easy understanding. They created this model with their own dataset. As the number of samples in the dataset is less they used image augmentation and frame sequence generator techniques. They proposed a system which uses pretrained MobileNetV2 model to learn features from augmented frame sequence of Indian Sign Language gestures.

They acquired an accuracy of 99.57% on the Indian Sign Language dynamic gesture dataset. They planned on extending their work to generate Indian Sign Language sentences. They are also planning to create a new dataset of Indian Sign Language (ISL) sentences basing the dictionary launched by Indian Sign Language Research and Training Centre (ISLRTC). In future the results obtained using their dataset on MobileNetV2 and other pretrained models will be compared.

[6] Nimisha and Jacob, in this paper explained different methods used in sign language recognition. They explained some of the models that use Artificial Neural Networks (ANN) and Support Vector Machine (SVM) for the purpose of classification.

[7] This paper presented a dataset for Indian Sign Language (ISL) namely Indian Lexicon Sign Language Dataset-INCLUDE. This dataset contains signs of 263 words across 15 categories. This dataset contains 4287 videos recorded with the help of experienced signers. A subset of this dataset with the name INCLUDE-50 is also derived for performance testing of models. They tested this dataset with various Sign Language Recognition systems and their accuracy is noted down. Accuracy of a model using INCLUDE-50 is greater when compared to a model using INCLUDE dataset.

[8] Gautham Jayadeep and Vishnupriya along with others proposed a model of Indian Sign Language recognition used especially in the field of banking. They created their own dataset for the training of the model. They used Inception V3 of CNN for the extraction of features which are then passed to LSTM layer for the classification and are further translated to text. This model can be improved by adding more words to the dataset and can be fully automated. This system can be extended further for text to speech conversion.

[9] Model proposed by Kinjal and Brijesh used pretrained model with INSIGNVID-the first Indian Sign Language video dataset. Using this model the videos of signs are converted to English sentences. They planned on testing the model against unseen sentences.

[12] Muthu Mariappan and Gomathi proposed a model where they used combination of CNN and LSTM-RNN to get better performance of the model. This model is trained with CasTalk-ISL dataset. This is just a part of their goal product, which is translating hand gestures to speech. They planned to work with less samples of 100 words reducing the complexity and time of the computation.

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