# Sign Language Detection: A Review

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*Abstract*—**Sign Language is a derived language for communication between deaf and dumb community people. It is the most significant and reliable way of communication between normal people and hard of hearing and speech impaired people without the need of interpreter. Every country has introduced its own sign language. The sign language developed in India is known as Indian Sign Language. In this paper, we present a literature of the latest advancements in the area of sign language(recognition). First, we review the techniques of gesture recognition and highlight some critical and important methods in recent developments. Next, we focus on the analysis and discussions about the challenges and any other possible solutions for the sign language recognition. Finally, we outline the TensorFlow method of recognition.**

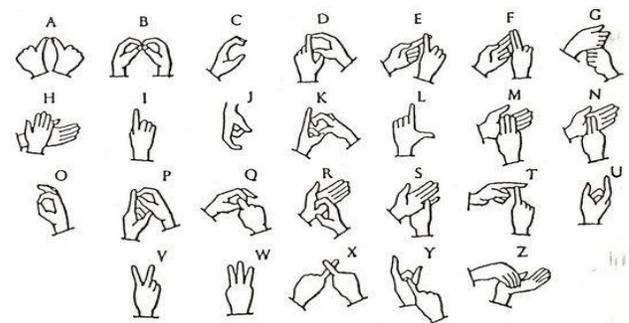*Keywords- SLR (Sign Language Recognition), Gesture Recognition.*

Figure 1. Representation of ISL Alphabets(A-Z) [3]

## I. INTRODUCTION

Sign Language is a way of communication in a very convincing way. It is the way through which the dumb or deaf people can communicate to the external world. Sign language is the means of communication through hand signals, facial expression, gestures of figures and body language. Gestures can be determined by physical motion of different body parts such as fingers, arms, hands, head, neck, eyes, etc. Gestures are very essential component as it provides all the meaningful information. People with disabilities including Autism,

During the conversation between a deaf and a normal person, the deaf can comfortably converse through his/her sign language and the normal can use the sign language predictor to understand what the other person is trying to say. Most of the people don't understand the sign language as it is not a very common way of conversing. The conversation between the deaf and other population becomes difficult. Through sign language recognition one can easily understand what the other wants to convey. The purpose of sign language detection

system is to provide an efficient and accurate way to convert sign language into text messages. The system has a huge future scope as it makes communication more efficient and easier. This promotes cultural awareness, literacy, and other intellectual benefits.

## II. GESTURE RECOGNITION APPROACHES

Gesture is referred as any non-verbal communication i.e.; whose aim is to communicate a specific message. Gesture recognition is a process of movement of body parts specially through hands, limbs, head to convey one's message. Gestures allows one to express their feelings, thoughts, emotions, etc. Gesture recognition is a type of perceptual computing user interface in which the computers capture the gesture and convert the human gestures into commands. The real meaning of gesture recognition is the ability of a system to understand the gestures and execute the commands accordingly. The main purpose of the gestures is to understand the sign language which will directly help in SLR (Sign Language Recognition). SLR approaches are categorized based on the gadgets used to recognize the SL. The hand gesture recognition is performed using following techniques: (i) Vison Based and (ii)Data glove approach (instrumented).

### 1) Vision Based Approach (VBA)

Just like the name suggests, this vision-based approach for SLR uses image or video as an input. If the input is a video, successive frames are taken into consideration. Camera is acting as the main input device which is used to capture the images that will be used for further processing. In this approach mainly, gloves are not used. VBA is comparatively easier and also has lower computational cost.
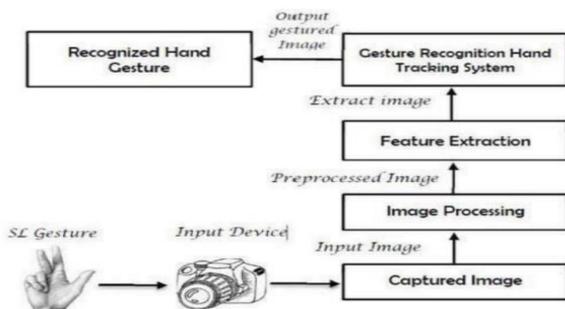


Figure 2.   VBA [1]

To recognize the corresponding sign image processing and signal processing is performed. The captured image is transferred to the pre-processor and then the feature vector of the image is compared with the already stored data set. Few probabilities are determined during this operation and using the final probability, the sign is divided into its corresponding class. VBA initiates human computer interface. VBA approach for SLR is shown in Fig 2.

### 2) Data Glove Approach (DGA)

For capturing the pose of the hands and its motion data gloves are used. The gloves are connected to both hands. Since the hundreds of sensors are attached to the gloves, the position of the hand, placement and orientation are calculated accurately. The fast reaction speed is the main advantage of this method. This approach is highly accurate. It is not affordable by the common deaf people as it consists of high cost sensors. DGA approach for SLR is shown in Fig 3.
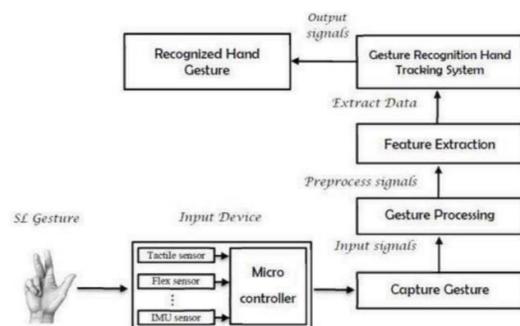


Figure 3.   DGA [1]

## III. RELATED WORK

1. Already existing system is present for the recognition of ISL using ANN (Artificial Neural Network) and SVM (Support Vector Machine) classifiers [1]. Using these two techniques they have developed the recognition system. The gestures were recognized using various feature extraction techniques like shape descriptors, SIFT and HOG individually along with SVM classifier and also, they have combined all these features and found that this combined approach provides an accuracy of 93%. Combination of HOG and ANN provides the accuracy as high as 99%. [1]

2. There is already system for recognition of ISL translator using gesture recognition algorithm. The proposed scheme translates the ISL numerals and alphabets into English. Combinational algorithm is adapted which includes Canny edge detection, YCbCr model for segmentation threshold etc for tracking hand movements. An accuracy of 97.5% is achieved. The complete system

was developed in MATLAB by using GUI (Graphical User Interface).

## CONCLUSION

This paper presents a survey on different hand gesture i.e.; sign language. The main aim of this recognition system is to enhance the human-machine interaction. In the recent years there has been development in the area of static hand gesture. Only few works have been reported related to dynamic hand gesture recognition. Most of the system are dependent on signer. In most widely used system the facial expressions are not included. The key challenge is to develop a system that will recognize both facial and hand gestures together.

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