

# Automatic sign language Recognition System

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## ARTICLE DETAILS

### Article History

Published Online: 20 February 2019

### Keywords

Sign language (SLs), Indian Sign languages (ISLs), Emotion Mining, Sign Reorganization

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## ABSTRACT

Communication is the essential part of human life and way to convey their ideas and thoughts with set of symbols or words. However, this general meaning of communication can demonstrate an obstruction in cases where languages fluctuate; specifically those have lacked the power of hearing and only have two major ways of communicating with others either lip reading and sign language. In these circumstances sign language is most appropriate way to convey ideas. Sign language (SLs) is the most effective approach of expression of thoughts and ideas for the deaf community. The proposed approach works to overcome this problem, thus improving the communication skills among deaf communities.

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## 1. Introduction

Language plays an essential role in human communication and most proficient means of communication for humans is through utilization of languages that they are instinctive from human interaction. However, this usual means of interaction may demonstrate an obstacle in cases where languages structure and linguistic are differ. This is nowhere further apparent than in the language communication obstacle among languages of dissimilar hierarchies, such as sign languages (SLs) and spoken. Sign languages (SLs) are very usual way of expression of ideas and implementations for the deaf peoples. Indian SLs are gestural language that gives information by utilizing hands and other body parts. In India, there are approximately 23 million peoples who are deaf or having impaired hearing and only 5 to 6% attend schools. The main cause for the lack of language and literacy skills between hearing impaired peoples are that there are incredibly very less resources in India that can give education to these peoples. Therefore is a special attention of automated resources or systems that can overcome this issue and enhancing the communication skills amongst deaf peoples.

Indian Sign languages (ISLs) usually utilize hand and body movements for interaction amongst deaf and hard hearing peoples and sometimes signer employs the three dimensional track around him to express his point by utilizing hands with other body parts. The grammar and syntax of ISLs are completely dissimilar from that of spoken and written words utilized in India and specially utilized as a main medium of interaction amongst deaf peoples. It is further utilized in several regions of Indian subcontinent such as Sri Lanka, Bhutan, Nepal, Pakistan and Bangladesh etc. In India several types of sign language are utilized in dissimilar states and regions. The diverse dialects of ISLs have similar grammar rules and syntax but these may vary in terms of lexical variations. The works contains into four parts: literature review, proposed model, implementation and conclusion. The upcoming section highlights the works of eminent researcher.

## 2. Literature Review

This section defined the research of renowned researchers and explores the issues that still require to be addressed.

Nayan et.al [1] proposed a technique for the enlargement of language learning and communication learning that necessary for the education of students with a reflective hearing loss. The main idea was to give a consistent teaching and learning framework to a classroom teaching, which can use and encourage Indian Sign languages (ISLs) and also work to minimizing the load of teachers to perform as a valuable teaching process. It allows for simple conversion of several online video and association with ISLs captioning utilizing a 3D animation model worked to strengthen classroom teaching during the critical time. It first, converts the video to text with subtitles and speech processing approach through NLP tools and algorithms then matched to animated model that are then rendered to form a consistent video beside the inventive content.

Lalit et.al [2] presented the approach to translate English text to Indian Sign Language utilizing artificial animation system with real domain applications. The proposed approach consists of parsing tool that parses the input English context to phrase linguistic grammar demonstration, where Indian sign language grammar syntax imperatives are used to rearrange the words of the English context. The preprocessing module is used to removes the unnecessary words from the reorder context. Lemmatization is used to translate the words into the source type as the Indian sign language does not utilize the modulations of the words. In the last module each words of the context are then verified with lexicon that consist the English word with its HamNoSys hierarchy and the words that are not in the glossary are restored with their synonym.

Luis et.al [3] described the systematic study for enabling translation technology for sign languages and considered the recommended rules for efficient literature reviews such as NLP, software engineering and human computer interaction with entire element of computing categorization technique that openly associated to software engineering. This work highlighted the aspect of academic portfolio, industry linkage and several other prototype approaches. All existing technique already utilized in the industry for the synthesis and appreciation of sign languages and demonstrates a directly preference for incorporating utilize of deep learning models.

Vijay et.al [4] defined new Gurmukhi script technique that work to verification of handwriting with two techniques or factor namely, aspect ratio and relativity. The first one is aspect ratio

that measure the ratio of length and breadth of the word and valuable technique for recognition of the author even when dissimilar spaces have been utilized for the similar writing and even in dissimilar contexts. It also determine to length, breadth, aspect ratio, horizontal and vertical slants of the words. However, this work still required more improvement because real model is utilized f 41 consonants, 9 matras and 3 nasal symbols.

**State of Arts: Types of Signs in ISL**

There are two types of signs employed in India sign languages: Manual and Non-Manual signs. Manual signs are implemented with use of hands only and in other side the non-manual signs utilized body postures, mouth gestures and face expressions. The signs language of the words in ISL can utilize either manual or non manual or equally structure while signing. Manual sign languages are more categorized as one handed and two handed signs signals. The single centric hand is utilized for signing for one handed signs. The two- handed signs utilized equally centric and non-centric hands while signing. The manual signs also define the movement of hand that may be recurring or directly while signing a defined word.

The non manual sign languages defined with the head and body postures, mouth and face expressions, which can be utilized while signing.

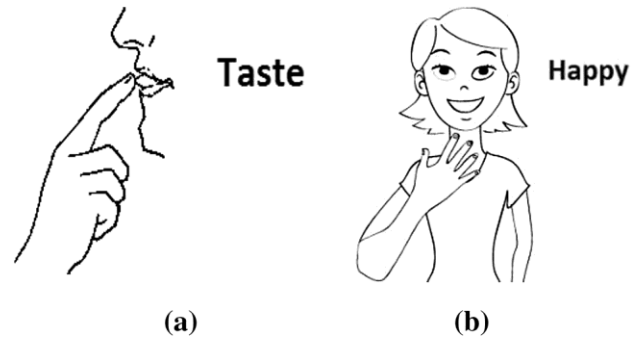


Figure 1: (a) Single handed static manual sign.(b) non-manual sign

The non manual signs also contains several eye gaze and eye lid expressions for defining a obtain sign signals. These signs can equally consider manual and non-manual structures while signing a specific word or context. In ISLs, the sign signals contains in manual structure while there are several signs that can consist non-manual structure only. For example the in Fig 1 shown that manual signs defined with only hands are utilized to communicate any sign and in other side non-manual signs body postures, gestures and face expressions are used. The various types of signs used in ISL are shown in Figure 2.

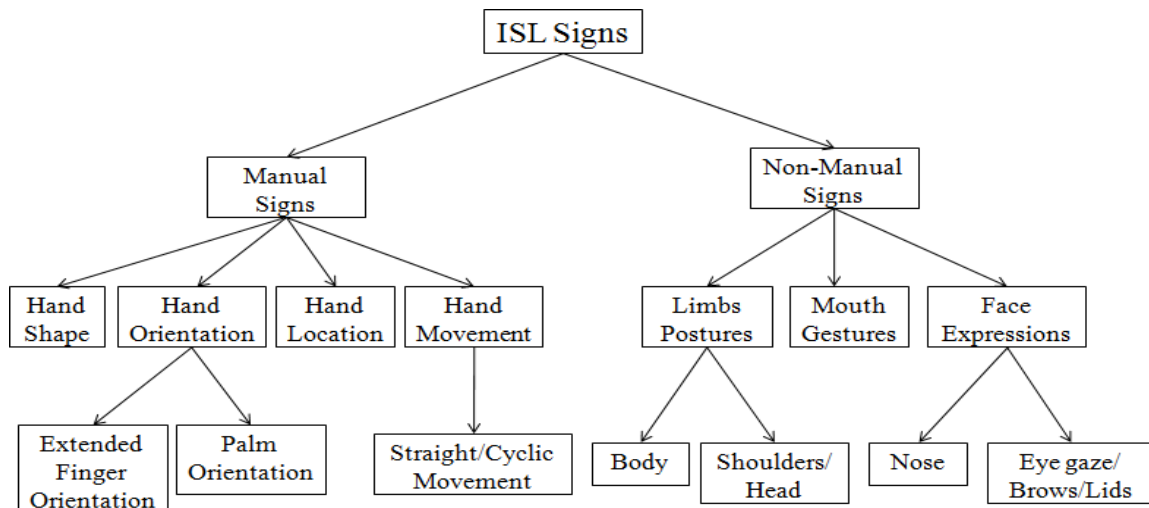
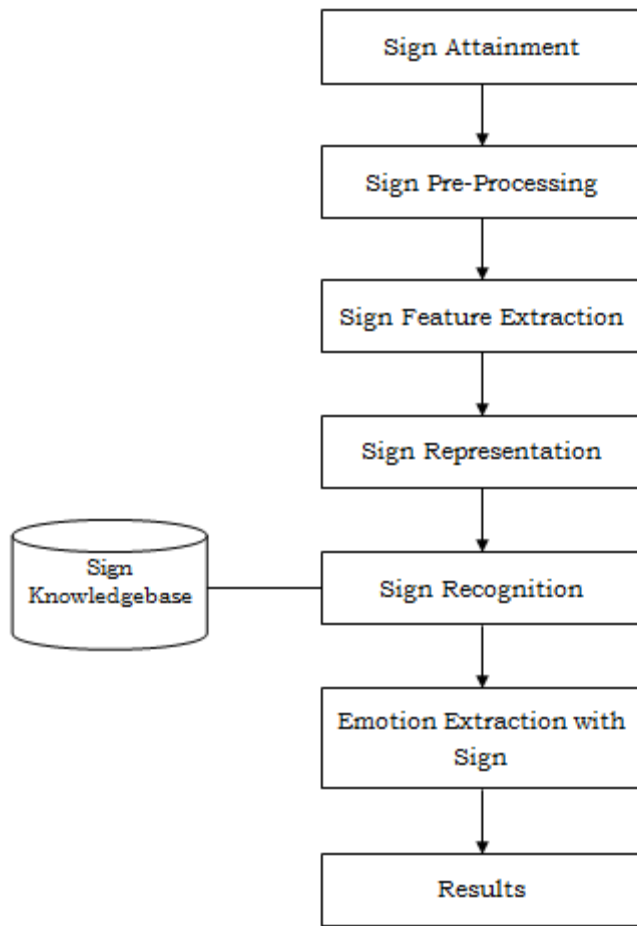


Figure 2: In manual signs only hands are used

**3. Proposed Model**

The proposed model implemented with ISLs library for automation of sign language and HamNoSys Sign Language Notation System used to take input of user and the system work that stored it in ISL Dictionary for automation of the signs

of the obtained word. The HamNoSys extends the latest notation system by further enlarging sign illustration by several more attributes. The proposed system implemented into following phases: preprocessing phase,



**4. Sign Attainment & Preprocessing Phase**

The query string or image are in unstructured form of data and in order to alter it to correct input form such as in structured input, routine procedures are used. It worked on the training text or images to obtain the Expanse of Implementation Section (EIS). The EIS can be works if only hand gestures are consisted or equally expression and hands if the facial gestures are also utilized. Generally the preprocessing phase considers

of data and image enhancement, resizing, filtering, segmentation and morphological process. To execute the filtering, image enhancement and segmentation can be done through the algorithm that better executes the input text, video or images. During this representation, the real text, images and videos are also processed to obtain the expanse of interest.

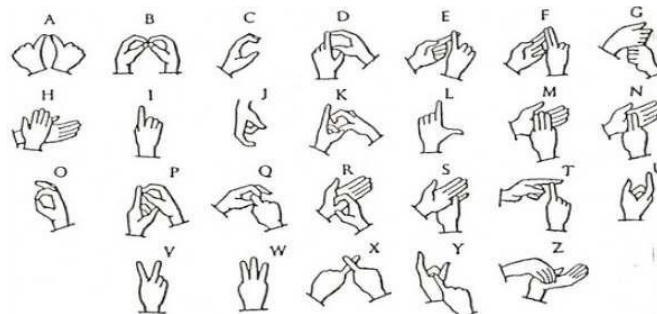


Figure 3: Indian sign language

The preprocessing phase can manage single sign or multiple signs and boundary detection algorithm required to be used to segment the incessant text or video of signs into process data of sign. Sign language attainment phase basically construct several module while obtaining the text, videos from input media and used filter process to remove noise if any.

**5. Sign Feature mining and Representation**

Feature mining phase plays a vital role of sign language recognition with the inputs to the classifier are the feature segmentation attained with this phase. The techniques utilized for feature mining should discover shapes consistently and strongly irrespective of modifications in enlightenment stage, arrangement and size of the entity in a text, video and image. Entity in a text, image and video are presented as compilation of elements or pixels. For entity identification we require explaining the features of these sets of pixels and used

different ways to obtain result with wavelet decomposition, Haar wavelets, texture features and histogram.

## 6. Sign Recognition

To determine the degree of similarity or dissimilarity of signing score utilizing a LDA algorithm that implements two forms: training phase and recognition phase. Every gesture is described as a column segment in the training phase and normalized segments with respect to standard gesture. The executive gesture projections were attaining with the eigenvector matrix then multiplied by all of the gesture segments.

## 7. Emotion Recognition

To capture the human emotion that has evolved in performs multipart actions, which need synchronization of several organs. Therefore, several actions define exceptional spatiotemporal accomplishment structures. In addition, various pairs of body emotions, such as working, walk and drinking,

can be executed at the similar time and their appearance might not be preservative. The two main components for achieving the human emotion have been described either a constrained symphony of human emotion elements or a kinematic logic worked on the emaciated structure of the human body actions.

## 8. Conclusion

The current research on sign language has shown that there is very little work in India that can impart real implementation about sign language among the deaf peoples thus resulting in unfortunate literacy ratio and language knowledge among deaf communities. In these circumstances the proposed approach plays an important role that work with HamNoSys / ISL dictionary and generation automation of sign language. It selected non-manual components, a translator for converting HamNoSys to SiGML and a 3D player for automating the signs.

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