

# Vision based sign language recognition: a survey

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**Abstract-**The Sign language is very important for people who have speaking and hearing deficiency generally called Deaf and Mute. It is the only mode of communication for such people to convey their message and it become very important for people to understand their language. This paper proposes algorithm or method for an application which would help in recognizing the different signs which is called Indian Sign Language. The method has been developed with respect to the single user. The real time images will be captured first and then it stored in the directory and on recently captured image and feature expulsion will take place to identify which sign has been articulated by the user through SIFT(scale invariance Fourier transform) algorithm. The comparison will be performed in arrear and then after comparison the result will be produced in accordance through matched key point from the input image to the image stored for a specific letter already in the directory or the database the output for the following can be seen in below sections. There are twenty six signs in Indian Sign Language corresponding to each alphabet out which the proposed algorithm provided with 95% accurate result for nine alphabets with their images captured at every possible angle and distance.

**Keywords-**vision based hand gesture recognition, deaf, mute.

## I. INTRODUCTION

There are so many people's in the world which are dumb. They do not have ability to speak. The communication between hearing person and dumb person is always challenging task as compared to the communication between blind people and normal people. This creates an extremely small space for them with communication which is essential part of human life. Sign language is powerful tools for dumb people. It uses gestures instead of sound to explain their meaning. These people uses the different body parts such as palm, finger movement and hands also its orientation, arms or body, facial expressions and lip patterns for explain their meaning. It is not universal, and just like a spoken language, it has distinct form of languages spoken in particular areas.

In this paper we are going to overcome the restrictions and convert action into text without using gloves. It has a capability of capturing human hand signals and produces text output accordingly. This project has a capability of detection, capturing and processing of hand gestures irrespective of the background.



Fig1: Sign language for dumb people

## II. LITERATURE SURVEY

In recent years large number of research has been done on tracking of hand motions in a sign language. Ying Wu et al. [2005] presented an Outlook for tracking of hand in image hierarchy using Monte Carlo algorithm. For their comfort, they used divide and conquer outlook for capturing hand poses and finger articulations. The tracing algorithm is based on sampling technique. The significant part of sequential Monte Carlo is to produce samples at time (t+1) from samples at time (t). Rezaei et al. (2008) also gave a novel algorithm for hypothesis of motion trajectory and orientation of hand. The algorithm presented by them is based on basic principle of control point expulsion to calculate motion parameters. Elmezain et al. [2009] proposed mean shift analysis and Kalman filter method for hand tracing in a complex environment using depth information. They proposed robust method of efficient tracing using 3D depth map as depth information solves the problem of overlapping between hands and face. Various video hierarchies with various hand shapes are tested. The images are taken by bumblebee camera model with 25 fps and 240X320 pixel resolutions. The mean shift iterations are applied on both hands and result shows the proposed work to be robust for online tracing. Akmeliawati et al. [2009] proposed marker less hand gesture recognition for New Zealand sign language. Firstly they gave an introduction of that language and compared vision based techniques as well as glove based techniques. The steps that they considered are detection of desired thing (head and hands). Second is the segmentation and tracing using different color spaces RGB, ICrCb, HASV. Tracing algorithm implemented is mean shift. The novel idea proposed the work of image segmentation by finding peaks in image's histogram. Finally gesture modeling and deliberation is done. 13 gestures and one unknown gesture ranking is used in dataset which is limited. Patwardhan and Roy [2007] contemplated the novel tracker capable of tracking objects based on position, shape, size and appearance. They worked for designing the tracer used to trace gestures to do a particular task (for controlling an audio player). Algorithm is improvised predictive Eigen tracer that used particle filtering. In the experiments with demonstrative gesture set 4 basic hand shapes, 64 gestures for training set and 16 additional are used and found that their proposed work is robust appearance based visual tracker. Allen et al. [2006] expanded the camshaft algorithm in combination with type of features. Comparison of effectiveness with other general purpose object tracing is done. Camshift is used by the compiler because according to them it consumes lowest number of CPU cycles assuming only a single hue in colour space model. Weighted histograms is used. A synthetic video is taken as input that includes concealment as well as orientation. The result shows that camshaft based tracer fails if weighted histograms are not used while if it is used then some noise such as sleigh and snow colors can be eliminated from target histogram. Binh et al. [2005] proposed the vision based hand gesture recognition system. They deputed the technique of Pseudo two dimension hidden markov models. For tracing Kalman filter is used and colour space model for detection. The experiment consists of 36 gestures of American Sign Language. Various papers and their approaches have been discussed.

## III. WORLD SURVEY

Sign language is one the most natural and expressive ways for the hearing impaired people. Indian sign language uses both the hands to represent each alphabet and gesture. ISL is derived from British Sign Language and French Sign Language. Most of the researchers in this area concentrate on the recognition of American Sign Language since most of the signs in ASL are single handed and thus it becomes less complex. Another attractive feature is that ASL already has a standard database that is available for the use. When compared ASL with Indian Sign Language relies on both hands and thus an ISL recognition is more complex. Most existing sign languages have been influenced by the French Sign language system (FSL). However communities around the world have their own signing systems prior to the exposure to FSL. The merging of this local signing system with FSL lead to be unique sign languages in different communities. The resulting sign language has now its own fabrication, grammar, semantics, etymology, syntax, pragmatics, and phonology. As such systems should be developed to translate each sign language independently, including ArSL, as is currently done.

The earlier reported work on sign language recognition is shown below:

Table 1: Survey on different sign language system for different modalities

| Sign language               | Modality used | Subset of sign language considered and recognition rate          |
|-----------------------------|---------------|--|
| Native Indian sign language | Hand          | Static signs (92%)<br>Dynamic signs (95.5%)<br>Sentences (92.5%) |
| South Indian sign language  | Hand          | Tamil letters (12 vowels and 18 consonants)                      |
| Bangladeshi sign language   | Hand          | Vowels (6), 10 numbers   |
| Malay sign language         | Hand          | 25 common words with sensor attached on both the hand            |

|                         |      |                             |
|-------------------------|------|-----------------------------|
| Arabic sign language    | Hand | 23 Arabic words (87%)       |
| Taiwanese sign language | Hand | 15 gestures                 |
| American sign language  | Hand | A-Z alphabets               |
| American sign language  | Hand | Sign database 50            |
| Brazilian sign language | Hand | Latin letters               |
| Chinese sign language   | Hand | Isolated and continues sign |
| American sign language  | Hand | 22 sign vocabulary          |
| American sign language  | Hand | 26 manual alphabets         |
| Indian sign language    | Hand | ISL alphabets and numbers   |

#### IV. INDIAN SURVEY

In India hearing impaired people is more compare to the other countries. Not at all have they used ISL, but more than one million deaf adults and around half million deaf children use ISL as a sort of communication. Deaf people, who live in villages ordinarily, do not have access to sign language. However, in all large cities and towns across the Indian subcontinent, deaf people use sign language which is not standard sign language. Awareness program and extensive work are being work on ISL in education system.

In 1970, linguistic work on ISL began and with contribution of a team of researcher from Vasishta and America et al. It was found that ISL is a language in its own right and is indigenous to the resulted in four dictionaries between 1977 and 1982 and Indian subcontinent. It was found that 75% signs are same in the regions of India. In 1998, another researchist from Germany (Dr. Ulrike Zeshan) compared signs from many different regions across the Indian subcontinent, including regions such as Kerala, Orissa, Bhopal, Jammu and Kashmir, Chennai, Darjeeling and Bangalore. She also observed that there are about 75% of the signs are nearly same across several regions. Further work was carried out by Zeshan and Vasishta on evolutive ISL grammar, ISL teaching courses, ISL teacher training program and teaching material that was approved by the Rehabilitation Council of India in 2002. There are many ISL cells working in India for awareness and use of ISL as well as teaching courses of ISL. Ali Yavar Jung National Institute is for Hearing Handicapped, Mumbai released "Basic course in INDIAN SIGN LANGUAGE". After this survey, it was found that there are about 405 deaf and dumb schools in India. Most of the schools use its own native sign language as learning and teaching aid, therefore, for awareness to use of standard ISL as a teaching aid is being done by several ISL cells and NGOs to help Indian dumb and deaf community to viaduct the communication gap between them. There are some common misconception about sign language which is reported in ISL literature

- "Sign language is almost same all over the world".
- "Sign language is simply a sort of gesturing or pantomime, and it has no grammar. Sign language is not a complete language".
- "Sign language is the delegacy of spoken language of hands.

So to conquer these misbelieves, there is a requirements of evolutive ISL interpretation system to help Indian hearing impaired people with the help of HCI and making them literate and self-dependent. Major research work is multi lingual Indian sign language dictionary tool and going on awareness, so there is a need for Indian sign language explanation tool. Following may be the major advantages of ISL explanation.

- Exploitation and the awareness of computer interface through ISL interpretation.
- Training and education will be easier throught ISL interpretation/visualization for Indian dumb and deaf people.
- Serving the mankind by the use of technology.
- Social aspect like humanity can increase in an individual mind by involving physically depraved people in our day to day life.
- Blind people can also use this system by extending it for voice interface.

## V. HARDWARE REQUIREMENTS

The hardware requirements are as follows

- Web camera
- Vision based computer

### A. Web camera

The term web camera is a combination of “web” and “videocamera”. The intension of webcam is, not surprisingly to propagation video on the web, webcams are typically small cameras that either connect to a user’s monitor or sit on a desk or through wireless. Most webcams connect to the computer through USB, though some use a Fire wire bond. Webcams typically come with software that permit the user to record video or stream the video on the web. Since the streaming video over the internet claim a lot of bandwidth, the video stream is typically compressed to reduce the “choppiness” of the video.

The use of webcam is boundless. The webcam mainly works by capturing a series of digital images that are transferred by the computer to a server and then articulated to the hosting page. Webcams vary in their capabilities and highlights and the variance reflected are in price. The maximum durability of webcam is lower than that of handheld cameras, since higher resolution would be diminished anyway. For this reason the webcams are relatively uncostly.

A webcam is a video camera that propagates its image in real time to a computer or a computer network. . They have also do a source of security and privacy issues, as some built-in webcams can be remotely activated through spyware.



Fig2: Webcam

### B. Vision based computer

Computer vision is a field that incorporates methods for acquiring, processing, analyzing and perception images and, in general, high-dimensional data from the real world in order to produce symbolic or numeric information.

Computer vision has also been mentioned as the avocation of automating and integrating a wide range of processes and representation for vision based knowledge. As a Scientific discipline, Computer Vision is belonging with the theory behind artificial system that mention the information from the images.

The software use for vision based computer is a MATLAB.

## VI. CONCLUSION

The major objective of this project is to give significance of ISL as an interpretation language and focus on various methods and techniques available for vision based hand gesture recognition. And also we observed the world survey. A critique of vision based hand gesture recognition methods has been presented. This research is related to vision based gesture recognition remarkable improvement has been made. To continue this rate it is clear that further research in the areas of sign extraction, classification methods and gesture representation are required to realize the ultimate goal of humans interfacing with machines on their own natural terms.

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