Vision Based Gesture Recognition

Saurabh Kumar Soni[1], Namrata Singh[2], Sagarika Gupta[3], Sachin Giri[4], Prof. N.U. Khan[5]
1,2,3,4-Information Technology, IMS Engineering College, Ghaziabad(U.P.), India.
5-HOD of Information Technology, IMSEC Ghaziabad(U.P.)

ABSTRACT-
Human-computer interaction is an essential part of most people's daily life. The plan is to design and implement the system that can perform general image processing of user image captured in real time so therefore most of the work is based on image processing techniques Hand gestures is the most important to exchange ideas, messages, thoughts etc. among different dumb people. Hand gesture can be defined as a variety of gestures or movements produced by hands or arms combined, it is always capable of expressing a signer's intentions so it can act as a means of natural communication between human and machine. Studies on hand gesture recognition is very important for the development of new human-computer interaction. This paper reviewed the current study status and application of gesture recognition aiming to summarize the commonly used hand gesture recognition methods, analysis their strength and weak points, and list the challenging problems in current research of hand gesture recognition.

Keywords: *Image Processing, Hand gesture, Python 2.7, Open CV, Human-computer interaction, Study status, Application.*

1. INTRODUCTION:

Hand gesture recognition is a relatively new field. Now a day's much research is going on in the field of Artificial Intelligence in Natural language processing. Hand gesture, body postures are also the natural languages. The use of hand gestures provides an attractive alternative to human-computer interaction (HCI), User generally use hand gestures for expression of their feelings and notifications of their thoughts. Hand gestures has been the most common and natural way for human to interact and communicate with each other. The Hands express the feelings and emotions of a dumb person. The hand moves reflect the state of mind even when one is not speaking. Gesture recognition is the topic in computer science and language technology with the goal of interpreting human gestures via mathematical algorithm. Recent researches in computer vision have established the importance of gesture recognition systems for the purpose of human computer interaction. The primary goal of gesture recognition research is to create a system which can identify specific human gestures and use them to convey information or for device control. A gesture may be defined as a physical movement of the hands, arms, face, and body with the intent to convey information or meaning. In the present day, there are different tools for gesture recognition, based on the approaches ranging from statistical modeling, computer vision pattern recognition and image processing. There different sign languages used all over the world such American sign language(ASL), British sign language, Italian sign language, Chinese sign language, Indian sign language etc. similarly Indian sign language is developed for Indians. This paper presents the gesture recognition for Indian sign language. Figure 1 shows the chart used for Indian sign language.

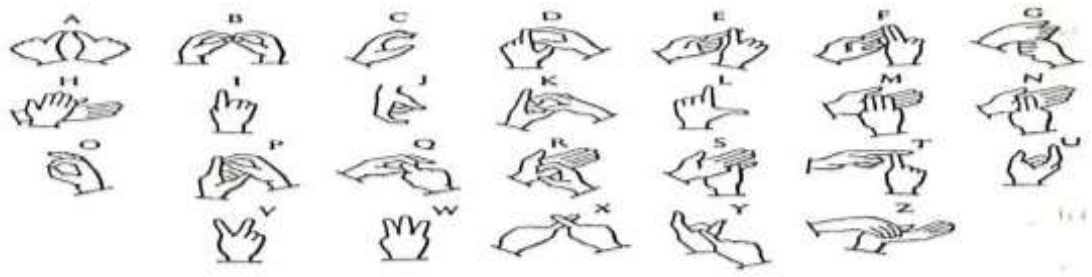


Fig.1. Indian Sign Language Gesture Chart.

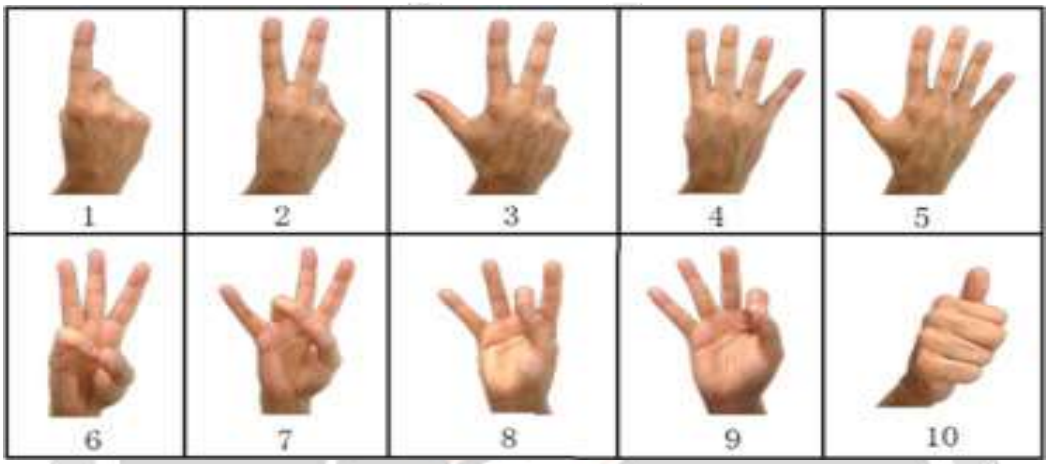
Gesture recognition, then, consists not only of the tracking of human movement, but also the interpretation of that movement as semantically meaningful commands [3]. This paper presents a review of real time vision based hand gesture recognition system.

2. METHODOLOGY:

The following is the method that we propose to be used for interpreting the hand gestures of a dumb person.

2.1 Image capturing:

The image used in this system consists of various signs used in Indian Sign Language for which translator help is required.



2.1 Image Capturing:

Capture frame and convert into grayscale. We convert an image from RGB to grayscale and then to binary in order to find the portion of the image. We are further interest for image processing.

2.2 Thresholding:

In a very basic term thresholding is like low pass filter by allowing only particular ranges to be highlighted as white while the other color is suppressed by showing the black

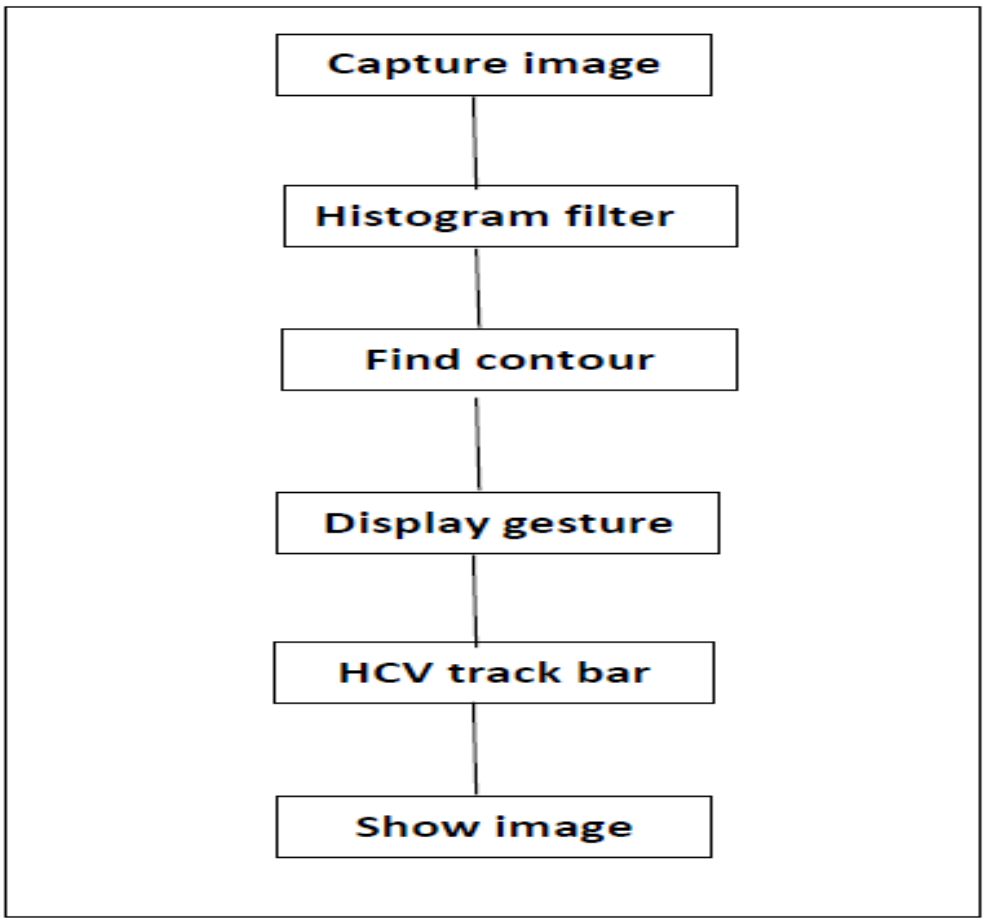
Fig.2. Contour

2.3 Find Convex Hull & Convexity Defects:

Now find the convex points and the defect point. The convex point is generally the tip of the finger but there is other convex point too. So, we find convexity defect which is the deepest point of deviation on the contour. By this we find the no. of finger extended and then we can perform different function according to no, of finger extended.

Fig.3. Convex Hull

3. FLOW DIAGRAM:



4. APLLICATIONS:

Hand Gesture recognition has a wide range of application in real life & real-time scenarios.

- Some advanced applications include tablet PC, games, medicine environment, and augmented reality.
- In desktop applications, hand gestures can offer a substitute interaction medium for mouse and keyboard. Many hand gestures for desktop computing tasks involve manipulating graphic objects or annotating and editing documents using pen-based gestures. Also use of pen gestures, make marking menu selections using stroke gestures.
- Virtual reality is one of application.
- ***Robotics and Telepresence****:* Telepresence and telerobotic applications are typically situated within the domain of space exploration and military-based research projects.
- In games
- In Sign Language Recognition.

5. USE OF SOFTWARES:

When implementing a technique/algorithm for developing an application which detects, tracks and recognize hand gestures, the software used are the important platforms. Some software's which can be used are

OpenCV: It is an open source computer vision programming functions library aimed at developing applications based on real time computer vision technologies.

Python 2.7: We use this platform for implementation.

6. PERFORMANCE ANALYSIS:

Performance evaluation for Hand Gesture recognition can be done by evaluating % Error in recognition or rate of recognition

7. FUTURE ENHANCEMENT:

1. By integrating our system with voice recognition system that we can embedded in ROBOTS.
2. We are able to handle dynamic image processing and event handling accordingly.

8. CONCLUSION:

The main objective of this paper is the vision based method used for gesture recognition with the different approaches. The model based methods is the method which is very computational intensive and also, used for live analysis i.e. real time. During implementation, the static and dynamic methods can be implemented and results can be compared. But the support vector machine from study gives the better performance. The study is done for the Indian sign language as more research till now is carried from American Sign Language and Chinese sign language. OpenCV software is preferred as it is applicable for real time and execution is faster. Application can be in gaming, robotic control, computer/laptop interaction for deaf people, 3D interaction etc.

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