A SURVEY ON HAND GESTURE RECOGNITION FOR DYNAMIC IMAGES

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ABSTRACT -- *Hand gesture recognition system provides us a natural, user friendly way of interaction with computer. According to WHO, world about 65% people are visually impaired, 5% are deaf and 28% are dumb of all the population. The voice and vision are the major defect for these people. Sign language is the common way to communicated among them but it is not necessary that all physically challenged people can understand. Many people can't express their feelings to others; they are dependent on sign languages. Problem also arises because of different sign languages; such as American Sign Language, Indian Sign Language, Indo Pakistani Sign Languages, British Sign Languages, Spanish Sign Language and many more; as they don't know other sign languages. Sign language is composed of different gestures and body movement. This paper provides us various methods and techniques of hand gesture recognition.*

Keywords-- *Normalization, skin detection, skin colour model, testing, training, canny algorithm, flex sensors, LCD display, USB keywords, Gaussian function, KNN, SVM, ANN, LCS ,HMM, Skin color elliptical boundary model, Linear extrapolation.*

I.   INTRODUCTION

The purpose of this document is to provide a broad introduction to the field of hand gesture recognition using image processing. There are many rapid developments in computational world which can easily connect one to others. Image processing provides a way which manipulates the digital image and gives the desired output. There are different techniques which are being used as mathematics, filters, trend removal, image analysis, convolution edge detection, gesture recognition.

In recent years there are many development made on hand gesture recognition using several techniques andalgorithm for static hand gesture recognition so that person can communicate with each other using image processing. A Static hand gesture algorithm which overcomes the challenges (such as rotation, size and position variation of the images) for detection of hand gesture images, is developed in this work. It works even well in the background clutter.

In current development trends in image processing dynamic hand gesture recognition are replacing the static hand gesture recognition as it is much useful and helpful in day to day life in various places. Here all the input will be in video form and then it will convert those video into frames. As the frames will be formed different segmentation process are used to divide the frames into different number of cluster and recognize the image. Then it will do the feature extraction by using various techniques and then send the extraction for classification. There are several

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classifiers which will classify the image using different algorithms and then compare the extracted image with the saved images saved in database.

II.   HAND GESTURE OVERVIEW

Hand gesture recognition recognises several gestures made among people. It includes gesture to be made and recognition to recognise the gesture. Gesture acts as a medium to communicate with each other and expresses meaningful feelings. It is of two types, one is manipulative and other is communicative gesture. Manipulative are those which act on objects to express things whereas communicative having an inherent communicational purpose. Gesture recognition is tracking human gestures using representation and conversion to semantically meaningful commands.Hand gesture recognition

people that involves hand postures and dynamic hand movements. A hand posture represents a static finger configuration without hand movement, where as dynamic hand gesture movement consists of hand gesture with or without finger motion.Classification of hand gestures

(i) Static hand gesture: It is defined as orientation and position of hand in the space during an amountof time without any movement.

This system is mainly divided into mainly four parts:

1.Normalization: It is a process that changes pixel intensity values.

2.Skin colour detection: Image is captured using webcam and captured images is been converted into frames.

3.Skin colour model: It is to describe particular classes of objects which are available for the training pixels.

4.Hand gesture recognition: Recognizes the input and gives the output.
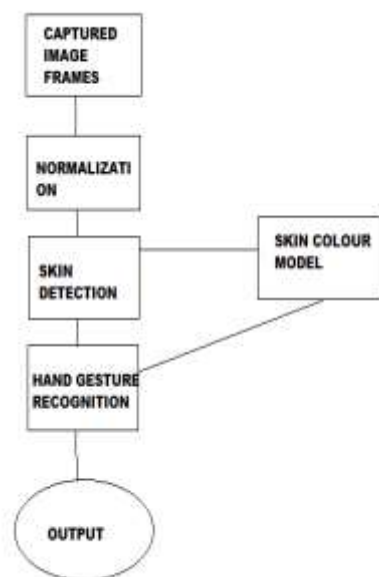
(ii) Dynamic hand gesture: If there is any movement in the mentioned time duration include gestures involving body parts like waving hands.

This system is mainly divided into two parts:transformation subspace for each hand- shape.

2. Testing stage: It mainly undertakes the detection and tracking part.
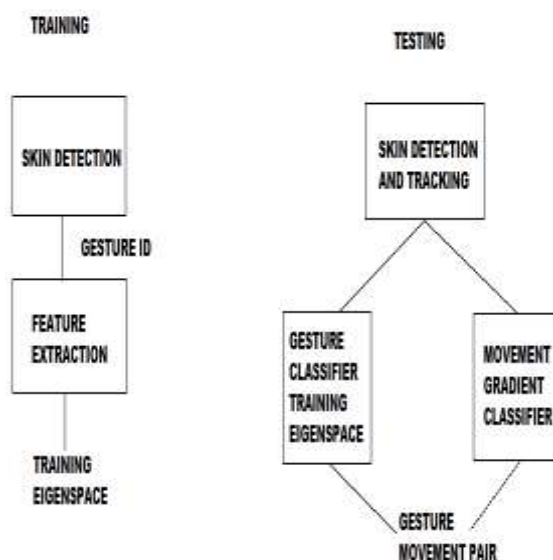
III.   LITERATURE SURVEY

3.1 FINGER   DETECTION   FOR   SIGN LANGUAGE RECOGNITION

The main idea of this paper is, it recognises the hand gesture as input using image processing algorithm and gives output for unimpaired people. As it undergoes Canny algorithm for edge detection. Where an edge detector reduces the pixel. The main advantage of this algorithm is to identify the points on digital image and also changes the image brightness accordingly. A minimal edge is found out by gaussian function. But the main disadvantage of using this canny algorithm it gives 5% error in gesture recognition.

3.2 NOVEL   APPROACH   FOR COMMUNICATION AMONG BLIND, DEAF AND DUMB PEOPLE.

The main objective of this paper is, sharojan bridge is used for communication it is concept of wearable technology. It consists of main five components (i) Arduino circuit board: It is used to transfer a message. (ii)Flex Sensors: It is a voltage divider circuit. It also provides a resistive carbon elements and resistance varies   from 10kohms to 30kohms.

(iii) and used for input operation which is connected to Arduino. It makes a bulky and massive Arduino boards.

3.3 HASTA MUDRA

The algorithm and techniques used in this paper are sign language recognition system. It is efficient and accurate mechanism to transcribe sign language into text and speech. They are mainly two devices (i) Device based and vision based. This is done based on the canny edge detection algorithm which mainly uses optimal edge detector. The use of this is to reduce the pixel. The main advantage of this algorithm is to identify the points on digital image and also changes the image brightness accordingly. A minimal edge is found out by gaussian function. But the main disadvantage of using this canny algorithm it gives 5% error in gesture recognition.

3.4 MYVOX: DEVICE FOR COMMUNICATION BETWEEN PEOPLE: BLIND, DEAF, DEAF-BLIND AND UNIMPARIED

This paper introduces two methods (i)Tactile sign language. (ii)Braille. Here, ARM based computer is a main processing unit which efficient and low power consumption. A main advantage in using USB keyboards is it can take any language as an input but only one disadvantage is it has many cables which are connected with. MYVOX is a device which is used as LCD display for text and speaker for speech. But only one disadvantage with MYVOX i.e. It is suitable for only static images not for dynamic images.

3.5 ACE ASSISTED COMMUNICATION FOR EDUCATION: ARCHITECTURE TO SUPPORT BLIND & DEAF COMMUNICATION:

This paper mainly explains about ACE architecture which incorporates virtual sign, a translator for sign language and other components to allow for real time translation between sign and oral languages. Where as this architecture supports any sign language. Where this ACE provides a fluid communication among deaf and blind people.communication. K-Nearest Neighbours classifier is a basic and non-tuned version mainly for instant testing of the created databases. Main disadvantage of this algorithm is it also detects the palm not only fingers.

3.6 A DYNAMIC HAND GESTURE RECOGNITION SYSTEM INCORPORATING ORIENTATION-BASED LINEAR EXTRAPOLATION PREDICTOR AND VELOCITY- ASSISTED LONGEST COMMON SUBSEQUENCE ALGORITHM

This paper contains 3 main highlights and uses 2

D camera to capture the image. First it will detect the hand gesture by 3 frames from the video by using skin-color elliptic boundary model. Skin- color elliptical boundary model will detect the skin colour in optimal time with low complexity background. Second, it will improve the accuracy using linear extrapolation method as it assumes that hand always maintains uniform linear motion on both horizontal and vertical direction in each neighbouring frames. For gesture classification it will use LCS algorithm which will find the ratio between length of LCS and total length of each templates rather than length of LCS of each gesture. The main problem in this algorithm is it can't find the difference between digits like 4,5,7 and the consuming time for each gesture is 80-110ms.

3.7 STATIC AND DYNAMIC HAND GESTURE RECOGNITION FOR AUGMENTED REALITY APPLICATIONS

In this paper, they had used infrared tracking system by mounting IRTT on thumb and index finger of both hands. They used static as well as dynamic gesture. Static gesture is defined by angle between fingers and do not vary with time. Dynamic gesture is marked by changing angles between elapsed time and use HMM model to find unknown gesture. Spline interpolation is used for smooth observation with variable length.

3.8 RECOGNITION USING VISION-BASED APPROACH FOR HUMAN-COMPUTER INTERACTION

In this paper, basic 5 phases are used in which hand detection, hand tracking and gesture recognition is done. First 3 frames of video sequence were considered. In hand detection, face detection is done by skin filtering and then removed by using Viola-Jones algorithm then 3 frame differencing is done for coloured frames and then for grey scale frames. For hand tracking, 3 steps are there initialization of tracking region, extraction of feature from initialized for tracking region and then refining is done. It uses 3 classifiers as a single classifier which includes ANN, SVM and KNN. Fivefold cross-validating process is used for testing. Then Friedman's and Kruskal-wallis test are conducted.

3.9 VISION BASED HAND GESTURE RECOGNITION USING DYNAMIC TIME WARPING FOR INDIAN SIGN LANGUAGE

This paper presents an algorithm of hand gesture recognition by using dynamic time warping methodology. The system consists of basically consist of three modules which contain real time detection of face region and two hand regions, tracking the hand trajectory. The hand trajectory will be both in the directions that are consecutive frames and distance from the center of the frame. The gesture recognition based on analyzing variations in the hand locations along with central of the face. It removes background complexity and the distance from the camera should be 2 meters. We can find the optimal alignment between the stored databases and feature. It has accuracy is 90% in recognizing24 gestures based on Indian Sign Language.

3.10 HAND GESTURE RECOGNITION SYSTEM USINGIMAGE PROCESSING

The main objective of this paper is to create accurate recognition for detected hand posture for static image using SIFT algorithm. It will help in reliable matching between different views of same object, image classification andimage from the camera then process the captured image using segmentation. As it getthe segmented image it will perform feature extraction using SIFT method. For reduction of feature dimension is done by using PCA. For classifier hamming distance will be used as classification and matching the data from database and accordingly it will display the image with character. The extracted key points are invariant to scale, orientation and partially invariant to illumination changes, and are highly distinctive of image. The computational time will be less.
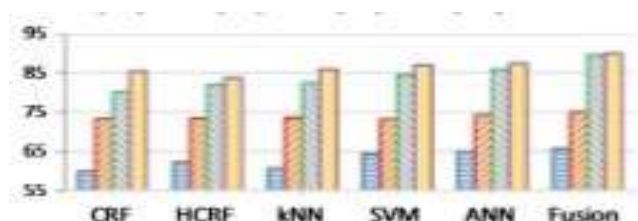
IV. CONCLUSION

Hand gesture recognition is finding application for non-

verbal communication, playing games, in virtual reality for fit as well for physically challenge people. With increase in applications there is lots of research which is required in gesture recognition system. Many research carried out in static as well as dynamic gesture in last few decade. There are different techniques of the sign language

recognition are reviewed on the basis of sign acquiring methods and sign identification methods. There is several techniques involved recognition of hand, segmentation, feature extraction, classification. Approaches using like Skin-color elliptical boundary method, SVM, HMM, ANN, KN, combination of SVM, KNN, ANN, augmented reality, gloves, SIFT, LCS algorithm has been discussed.

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