A SURVEY ON REAL TIME HAND GESTURE RECOGNITION TO IMPROVE THE ACCURACY OF INDIAN SIGN LANGUAGE.

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Abstract- Sign languages are natural languages that are used to communicate with deaf and dumb people. There are many sign languages in the world. Main focus of the system is on Indian Sign Language (ISL). Basically, the system will concentrate on Hand Gestures. Hand gesture is a very important part of the body for exchanging ideas, messages and thoughts among deaf and dumb people. The proposed system will recognize the numbers 0 to 9 and alphabets from Indian Sign Language. It will initially identify the gestures from Indian Sign language. The system processes the particular gesture to recognize the number with the help of classification using Support Vector Machine. Additionally, we will convert identified alphabets and numbers into speech narrate it for visually impaired persons.

Keywords- Hybrid Approach, Indian Sign Language, Number Gesture Recognition. Feature Extraction, Support Vector Machine.

I. INTRODUCTION

World Health Organization reports says (2015), 360 million people all over the world are Deaf or have hearing difficulties. According to the Tamil Nadu census data, 27273 people are hearing impaired in Chennai. 80% of Deaf people are illiterate or semi-literate [1]. Language is expressed via manual signstream in combination with non-manual elements. Sign languages are full-fledged natural languages with their own grammar and lexicon. This means that sign languages are not universal and they are not mutually intelligible, although there are also striking similarities among sign languages [2]. Sign Language is a best way of communication and it is one of the primary languages between deaf, dumb and ordinary people. In total, there are over two hundred sign languages in use around the world today [3]. Some of them are American Sign Language, Indian Sign Language, Japanese Sign Language, Turkish Sign Language etc.

Indian Sign Language (ISL) is on the way of standardization, this task is given to Ramakrishna Mission Coimbatore by Indian Government. Indian Sign Language is a part of Sign Language which is mostly used by deaf and dumb people in India. Signs depend upon various regional languages. The problem arises when deaf and dumb people try to communicate using their language with the people who are unaware of their language [4]. So, it becomes necessary to develop an intermediate system which solves this issue by understanding various hand gestures. Researches in the field of sign language recognition and in the development of sign language translation technology was started in the 90's. Hand gesture related research can be divided into two categories. One is based on electromagnetic gloves and sensors, movements and orientation of the hand. But it is costly and not suitable for practical use. People want something more natural. Another one is based on computer vision-based gesture recognition, which involves image processing techniques. The system processes the hand gestures using classification algorithm as SVM.

II. MOTIVATION

Sign language is the most natural way of communication for the people with disabilities to hear, speak or with visual impairment. One of its most appealing applications is developing an interface of human machine interaction which is more effective. Our motivation behind this system is creating a hand gesture recognition system for disabled people to ease their communication.

III. OBJECTIVES

- To overcome existing drawbacks of sign language recognition system.

- To develop a low-cost system with a high-performance using thinning and SVM approach.
- To develop an Alphabet/Number Recognition System using gestures.
- To recognize numbers as well as alphabets.

IV. REVIEW OF LITERATURE

Dr. Dharaskar Rajiv, Dr. Mr. Futane Pravin, [5] "Hand Gesture Recognition System for numbers uses Thresholding", 2011. In this paper includes the techniques like thresholding, feature extraction, on the help of this feature they proposed a simple method for recognition of numbers. Here they have used thresholding value for recognition of numbers. The method is been divided into three stages i.e. first they captured image by using web camera after capturing image they applied threshold value on that and using that threshold value they recognized the numbers (2011).
We are using techniques like thresholding, feature extraction which helps in the recognition of numbers.

Aanksha Singh, Saloni Aora [6] Indian Sign Language Gesture Classification as Single or Double Handed Gesture Third International Conference on Image Intonation Processing, 2015. In this paper contain the features like image-preprocessing, HOG, feature extraction, gesture recognition on the basis of that they have proposed a system for decomposition of gestures into single handed or double handed gesture. They have used Histogram of Gradients (HOG) features and geometric descriptors using KNN and SVM classifiers were tried on a dataset consisting of images of 26 English alphabets present in the ISL under variable background. The HOG features when classified with Support Vector Machine were found to be the most efficient approach result of this system in term of accuracy is 94.23.
From this paper, we get the general idea of the features like image-processing, HOG, feature extraction, gesture recognition.

Anup Kumar, Mevin M. Domini [7], Sign Language Recognition 3rd in CI Confon Recent Advances in Information Technology I RAIT-2016. In this proposed system, they have made application for those who have vocal and hearing disabilities. It discusses an improved method for sign language recognition and conversion of speech to signs. The algorithm devised is capable of extracting signs from video sequences under minimally cluttered and dynamic background using skin color segmentation. It distinguishes between static and dynamic gestures and extracts the appropriate feature vector. These are classified using Support Vector Machines. Speech recognition is built upon standard module Sphinx.
From this paper, we get an idea of improving the accuracy in gesture and speech recognition using Support Vector Machines which is also used for classification purpose.

Liu X, Fujimura K (2004) [8]. "Hand gesture recognition using depth data". In this paper introduces a hand gesture recognition scheme based on depth data. The hand is firstly extracted from the acquired depth maps with the aid also of color information from the associated views. Finally, a multiclass SVM classifier is employed to recognize the performed gestures.
We are using the idea of segmenting the hand into palm and finger regions. Also, including the distances of the fingertips from the hand center and the curvature of the hand contour.

Priyal SP, Bora PK (2010) [9]. "A study on static hand gesture recognition using moments". In this context, the geometric moments and the orthogonal moments namely the Zernike, Tchebichef and Krawtchouk moments are explored. The proposed system detects the hand region through skin color identification and obtains the binary silhouette. These images are normalized for rotation and scale changes. The moment features of the normalized hand gestures are classified using a minimum distance classifier.
From this paper we get the general idea of detecting the hand region through skin color and further obtaining the binary silhouette.

V. PROBLEM STATEMENT

To help and provide an opportunity for the dumb (speech impaired) and deaf (hearing impaired) people to communicate with an ordinary and visually impaired person.

VI. PROPOSED SYSTEM

The proposed work is to focus on the hybrid approach of algorithms for classification of numbers and alphabets. Proposed model consists of four phases i.e. Preprocessing, Feature Extraction, Classification, and Recognition. In the proposed model the method of thinning and SVM algorithm will be used. SVM for classification of feature extraction to classify numbers and alphabets. The first section of the proposed model consists of Image capturing or acquisition and preprocessing of the image. The very first step is capturing image through a camera or through a video. After getting an appropriate image, resize the image and extract hand parts from the image. Remove noise if present and convert it into a Binary Image.

The second section consists of Feature Extraction. There are many features available for gesture recognition but this system

will concentrate on figure tips and active-inactive fingers using thinning techniques. After getting features it will give it to SVM. SVM classifies the features. SVM classifies those features for higher accuracy and compares with training dataset and gives the output. Additionally, we will play the speech of those identified alphabets.

VII. PROPOSED SYSTEM ARCHITECTURE

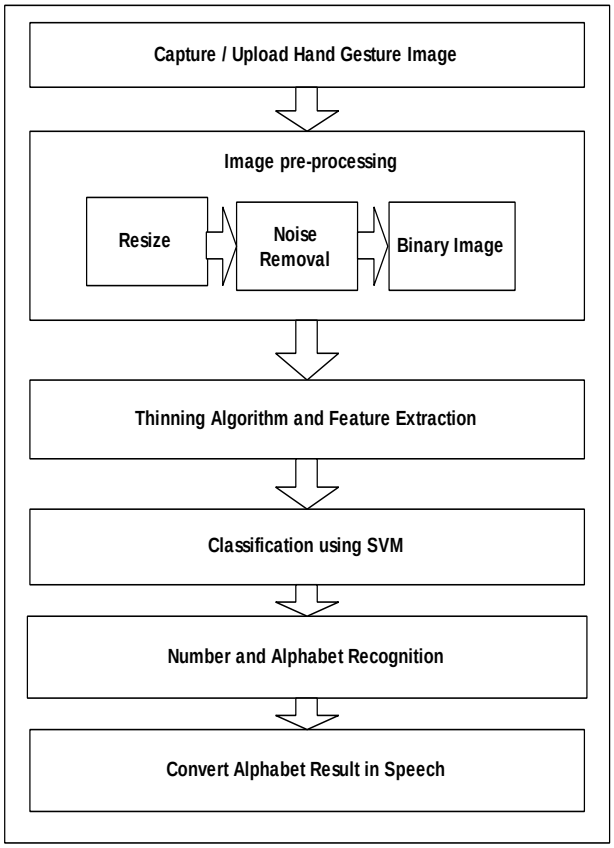

Fig: Proposed System Architecture

VIII. ADVANTAGES

Gesture-based interfaces have many advantages and provide the user with completely new form of interaction. However, this kind of input also raises issues that are not relevant with traditional input. On the user's side, these problems are to learn, to remember and to accurately execute these gestures. The developer has to provide a system that correctly recognizes these gestures. Therefore, the developer not only has to ensure that gestures are quickly and correctly recognized, but also has to provide a guide that allows a rapid and easy learning of these gestures.

1. Real time hand gesture recognition system is useful for dumb and deaf person which is used to ease the communication between ordinary people.
2. The system will enable speakers (convert text to speech) to better understand and communicate with those with visually impaired person.
3. Low cost System.
4. System Recognize Numbers as well as Alphabets.

IX. DISADVANTAGES

1. Variation of illumination conditions; where any change in the lightning condition affects badly on the extracted hand skin region.
2. Rotation problem: This problem arises when the hand region is rotated in any direction in the scene.
3. Background problem: Refers to the complex background where there are other objects in the scene along with the hand objects, and these objects might contain skin color which would produce misclassification problem.
4. Translation problem: The variation of hand positions in different images also leads to erroneous representation of the features.

X. EXPECTED RESULT

The expected result for our proposed system is recognizing the alphabets (A-Z) and numbers (0-9), through the Hand Gesture Recognition System, converting it into a text format and further to a speech format as well.

People can also try to communicate online through this system from different places, we can implement this using internet connection. The scope of this is concluded only one side.

XI. CONCLUSION

Hand gesture recognition for real-life applications is a very challenging task because of its requirements on the robustness, accuracy and efficiency.

In this work, a good comparative study has been adopted based on the methodology proposed using thinning algorithm and support vector machine. This will help to improve recognition accuracy of number gestures and also recognize the active fingers names and position. In our proposed system, we process the input gesture in preprocessing phase, thinning method for feature extraction and finally using SVM for recognizing the exact gesture using alphabets and numbers. Additionally, we will convert these alphabets into speech. The effectiveness of the design in a real-world situation has been demonstrated by a physical implementation of the system.

This system work will completely be done by using python and it will be successfully executed.

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