SIGN LANGUAGE RECOGNITION USING NEURAL NETWORK

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Abstract - Hand Gesture recognition system provides us an innovative, natural, user friendly way of interaction with the computer which is more familiar to human beings. Gesture Recognition has a wide area of application including human machine interaction, sign language, immersive game technology etc. By keeping in mind the similarities of human hand shape with four fingers and one thumb, this paper aims to present a real time system for hand gesture recognition on the basis of detection of some meaningful shape based features like orientation, center of mass (centroid), status of fingers, thumb in terms of raised or folded fingers of hand and their respective location in image. The approach introduced in this paper is totally depending on the shape parameters of the hand gesture. It does not consider any other means of hand gesture recognition like skin color, texture because these image based features are extremely variant to different light conditions and other influences. To implement this approach, we have utilized a simple web cam which is working on 20 fps with 7 mega pixel intensity.

1. INTRODUCTION

Interface with computers using gestures of the human body, typically hand movements. In gesture recognition technology, a camera reads the movements of the human body and communicates the data to a computer that uses the gestures as input to control devices or applications. For example, a person clapping his hands together in front of a camera can produce the sound of cymbals being crashed together when the gesture is fed through a computer. One way gesture recognition is being used is to help the physically impaired to interact with computers, such as interpreting sign language. The technology also has the potential to change the way users interact with computers by eliminating input devices such as joysticks, mice and keyboards and allowing the unencumbered body to give signals to the computer through gestures such as finger pointing. Unlike Haptic interfaces, gesture recognition does not require the user to wear any special equipment or attach any devices to the body. The gestures of the body are read by a camera instead of sensors attached to a device such as a data gloveIn addition to hand and body movement, gesture recognition technology also can be used to read facial and speech expressions (i.e., lip reading), and eye movements. The literature includes ongoing work in the computer vision field on capturing gestures or more

1.2 Objective

● Serving mankind by use of technology.

● Education will be easier through this, reaching a larger number of people.

● The system can capture hand gestures and navigate the words as in text format it will use for muted persons to see these words and understand the sentences.

● It is also usable for blind peoples because they need to communicate with normal persons (using speech recognition).

2. LITERATURE SURVEY

● "An Approach for Minimizing the Time Taken for Translating Sign Language to Simple Sentence in English"

Aradhana Kar, Pinaki Sankar

Sign Language is the language of deaf. There are different types of sign languages spread all over the world. American Sign Language (ASL) is one of the sign languages. ASL is used by deaf Americans. We had created a system that translates sign language videos to simple sentences in English.

● "Deep Convolutional Neural Networks for Sign Language Recognition"

G.Anantha Rao, Guntur (DT)

Extraction of complex head and hand movements along with their constantly changing shapes for recognition of sign language is considered a difficult problem in computer vision

● "American Sign Language Recognition using Deep Learning and Computer Vision"

Kshitij Bantupalli, Ying Xie

Speech impairment is a disability which affects an individual's ability to communicate using speech and hearing. People who are affected by this use of other media or communication such as sign language.

- "Recent Developments in Sign Language Recognition Systems"

M.F. Tolba, A.S.Elons

Automated translation systems for sign languages are important in a world that is showing a continuously increasing interest in removing barriers faced by physically challenged individuals in communicating and contributing to the society and the workforce

- "Interactive Systems for Sign Language Learning"

Iurii Krak, ii Kryvonos

In the article the problems of communication of deaf people using sign language are considered. An analysis of sign language information transfer which includes human hands, body, fingers movements, change of mimicry and emotions on human face is brought.

- "Moment Based Sign Language Recognition For Indian Languages"

Umang Patel, Aarti G. Ambekar

Communication plays a major role in day to day life. But it is very difficult for normal people to communicate with deaf, dumb & blind people & vice versa.

- "Hand Sign Language Recognition for Bangla Alphabet using Support Vector Machine"

Md Azher Uddin, Shayhan Ameen Chowdhury

The sign language considered as the main language for deaf and dumb people. So, a translator is needed when a normal person wants to talk with a deaf or dumb person. In this paper, we present a framework for recognizing Bangla Sign Language (BSL) using Support Vector Machine.

- "Sign Language Learning System with Image Sampling and Convolutional Neural Network"

Yangho Ji, Sunmok Kim, Ki-Baek Lee

This paper proposes a novel sign language learning system based on 2D image sampling and concatenating to solve the problems of conventional sign recognition. The system constructs the training data by sampling and concatenating from a sign language demonstration video at a certain sampling rate.

- "Machine Learning Techniques for Indian Sign Language Recognition"

Kusumika Krori Dutta, Sunny Arokia Swamy Bellary

Sign language is the only medium through which especially abled people can connect to the rest of the world through different hand gestures. With the advances in machine learning techniques, Hand gesture recognition (HGR) became a very important research topic.

- "Gesture Recognition Using Kinect for Sign Language Translation"

Harsh Vardhan Verma, Eshan Aggarwal, Satish Chandra

Sign Language is a widely used method of communication among the community of deaf-mute people. It contains some series of body gestures, which enables a person to interact without the need of spoken words. Although the use of sign language is very popular among the deaf-mute people but the other communities don't even try to learn it, this creates a gulf of communication and hence becomes a cause of the isolation of physically impaired people.

3. EXISTING SYSTEM APPROACH

The overview of the hand gesture recognition system (as shown in Fig. 1) consists of the following stages. The first stage is the hand gesture image capture stage where the images are taken using a digital camera under different conditions such as scaling, translation and rotation. The second stage is a preprocessor stage in which edge detection, smoothing, and other filtering processes occur. In the next stage, the features of the images of hand gesture are extracted using two methods, namely, hand contour and complex moments. The last stage is the classification , where the recognition rate is calculated for both hand contour-based and complex moments-based and comparison is carried out. The following is a description of these stages.
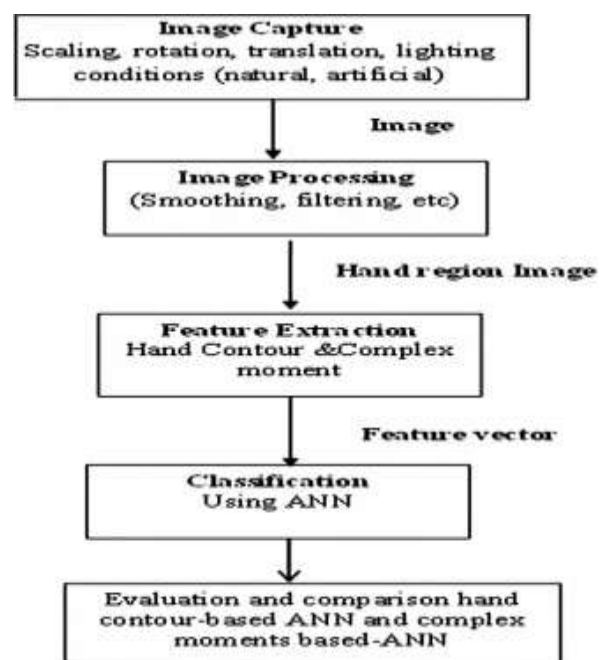

Fig 1: System Architecture

Disadvantages:

- It could not be accurate.

- Less stability provides.

- Time consuming for capturing images.

- It is not flexible for blind people.

4. PROPOSED SYSTEM APPROACH

The system converts the Gestures video into simple words in English as well as make a sentence of that each word in English. The CNN process used in the video processing module gives the matched results. Based on the right match, the Sign Writing Image File is retrieved and stored in a folder. This folder served as the input to the Natural Language Generation Module.
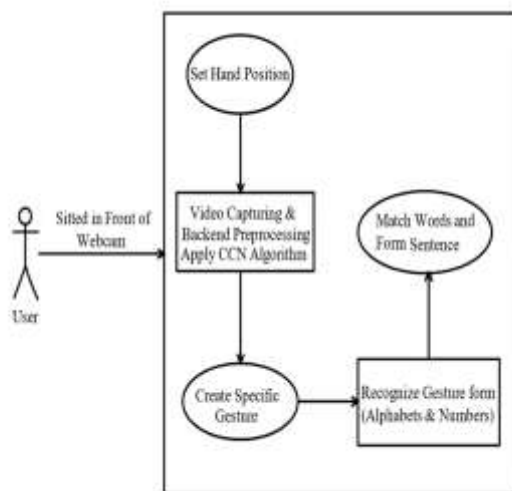
ALGORITHMS IN PSEUDOCODE

1. Convolutional Neural Network (CNN) Algorithm

A Convolutional Neural Network (CNN) is comprised of one or more convolutional layers (often with a subsampling step) and then followed by one or more fully connected layers as in a standard multilayer neural network. The architecture of a CNN is designed to take advantage of the 2D structure of an input image (or other 2D input such as a speech signal). This is achieved with local connections and tied weights followed by some form of pooling which results in translation invariant features. Another benefit of CNNs is that they are easier to train and have many fewer parameters than fully connected networks with the same number of hidden units.

Input: Hand sign gestures through webcam.

Output: Recognize gesture then classification and make sentences.

Step1 (Feature Extraction): -

 In this part, the network will perform a series of convolutions and pooling operations during which the features are detected. If you had a picture of a hand sign, this is the part where the network would recognize fingers, hand, and edges.

Step2 (Classification): -

Here, the fully connected layers will serve as a classifier on top of these extracted features. They will assign a probability for the object on the image being what the algorithm predicts it is.
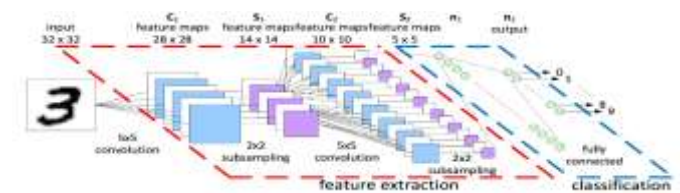

5. RESULTS

Sr.No Algorithm Process Accuracy Results

1 Convolutional Neural Network Classification Technique 0.9248769

In this paper, We can developed system for muted persons which they can interact with normal persons so the American Sign Language System (ASL) introduce to manage the problem, the system applying neural networks classification approach for identifying the hand gestures like alphabets or numbers so the system can predict accurate result of hand sign and make the words as in the form of sentences.
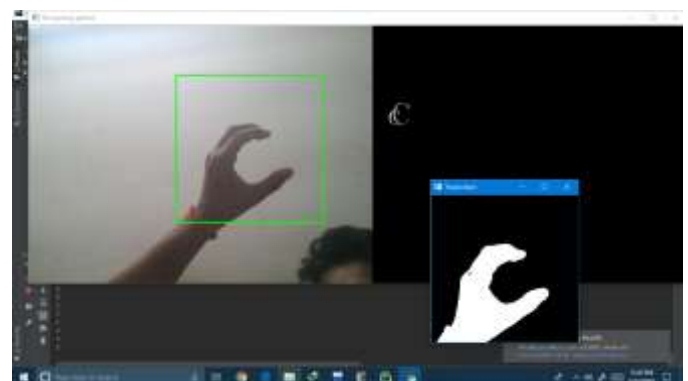
6. CONCLUSION

The sign language recognition system feasible for muted persons because of them can be communicated in deaf via this system. The system can capture hand gestures and navigate the words as in text format it will use for muted persons to see these words and understand the sentences. It is also usable for blind peoples because they need to

communicate with normal persons (using speech recognition).

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