HAND GESTURE TO SPEECH MAPPING

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Abstract: In this paper we propose a system which serves as a communication medium between partially impaired (deaf-mute) people and an ordinary person by making use of Sign language Interpretation (SLI) technique. Human Computer Interaction (HMI) is a decent way to benefit partially impaired person to interact with an ordinary person with the assistance of a computer. Thus we propose a method to recognize the hand gestures used in the sign language and then convey the meaning of the sign language in the speech form. The system extracts meaningful characteristics from the figures, such as angles between fingers, to achieve a high-accuracy, which uses a classifier to decide which gesture is being performed. We show that our approach allows

recognizing 26 static hand gestures of American Sign Language each of English vocabulary A-Z and digits 0-9 along successfully.

Index Terms- human machine interaction, Sign language interpretation, gesture to speech conversion.

INTRODUCTION

The sign language is a communication method for deaf and dumb i.e. hearing and speech impaired people but as they come across the other people who don't understand the sign language the communication becomes difficult. To overcome this barrier in communication it is necessary to build a device that can translate the sign language into speech in order to communication take place between the mute communities with the general public possible. Hand gestures are routinely used in daily life and they are natural, innovative for nonverbal communication. Gestures are the actions that convey the meaningful messages. It is more convenient and comfortable way of communication. Number of systems provides techniques for human computer interaction.

II. EXISTING SYSTEM

Over the last few years, number of researches is conducted on hand gesture recognition for human computer interaction and number of methods for segmenting an image and thresholding with and without background using MATLAB and openCV. From past three decades we are using the same techniques from communicating with the computer system. In early years, there were numerous techniques used for gesture recognition and tracking. For example, instrumented gloves, optical markers etc. These techniques have their own advantages and drawbacks. The instrumented gloves contain number of sensors in it, which gives the information about hand location, orientation and finger tips. They have high accuracy. But, they are too expensive and They need wired connection. Optical markers works with infrared light, which is the complex process. These systems require complex configuration.

III. PROPOSED SYSTEM

This project introduces a hand gesture recognition system which uses only hand gestures to communicate with the computer system. This algorithm divided into various parts i.e.: image acquisition of a video input, feature extraction gesture recognition and text to speech conversion. In feature extraction, we will find moments of the gesture, centroid of the hand and Euclidean distance to find finger count. We make use of contours, convex hull and convexity defects to find the hand gesture.Our aim is to design a human computer interface system that can understand the sign language accurately.
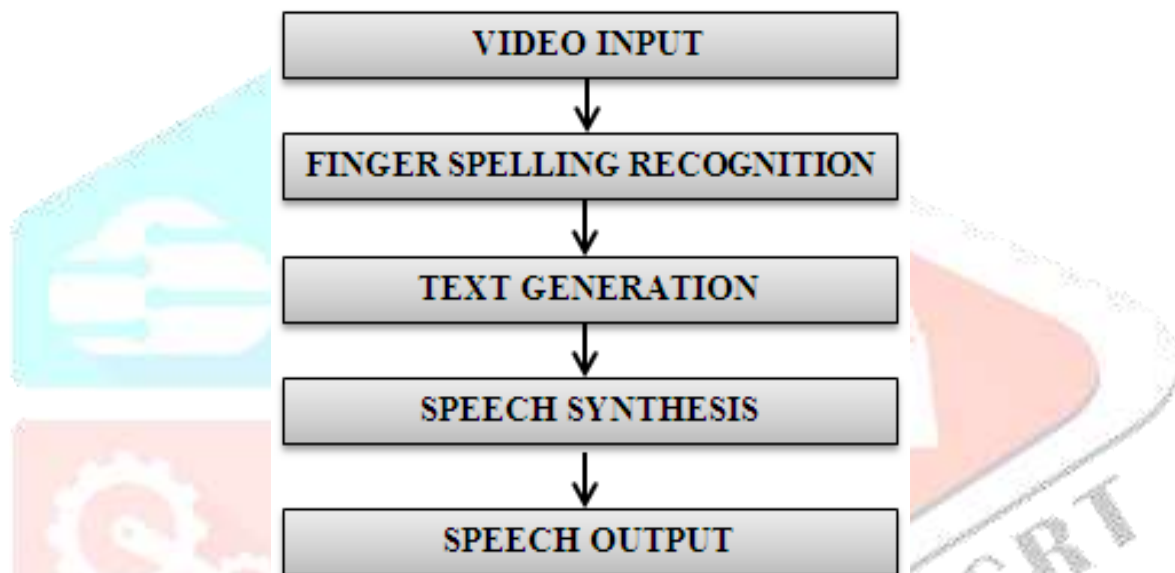
IV. SYSTEM IMPLEMENTATION

Fig.1. flowchart of implementation algorithm

In the proposed system the algorithm is divided into five essential modules

Module Description:

1. **Video input**

Image acquisition of a video input is the very first step of the proposed algorithm. acquiring an image during runtime through integrated camera and while acquiring these images will be stored in the directory after they are captured and the recently captured image will be acquired and that image will be compared with images stored for specific letter in the database using the algorithm and the comparison will give the gesture that was done and the translated text for the following gesture. The images will be captured through basic code of opening a web cam through OPENCV and then capturing the image through frames per second which will be stored in another directory where all the inputs images are stored in another directory and the recent captured image is picked up and the comparison with given set of images are made.

2. **Finger spelling recognition**

- **Feature Extraction :** For any of the object there are many features, interesting points on the object, which can be extracted to provide a "feature" description of the object in this hand segmentation is used to extract the hand image from the background.
- **Contours:** The contours are a useful tool for shape analysis and object detection and recognition. The contour is drawn along the boundary of the hand image which is found after thresholding.
- **Convex hull:** The convex hull is the set of continuous points in the Euclidean space that is connected to contours. Convex hull is drawn around the contour.
- **Convexity defects:** When the convex hull is drawn around the contour of the hand, it fits set of contour points of the hand within the hull. It uses minimum points to form the hull to include all contour points inside or on the hull and maintain the property of convexity.
- **Orientation Detection**: In it, will take the input of hand movement in any of the form or any orientation the gesture will be detected by the described section of feature extraction as the algorithm also includes the orientation assignment procedure.

3. **Text Generation**

Finally when the whole process is complete the application will be then converted into its recognized character or alphabet from the gesture which might be helpful to be understood in layman's language.

4. **Speech Synthesis**

Pyttsx text to speech
Pytsx is a cross-platform text-to-speech wrapper. It uses different speech engines based on your operating system:
- nsss – NSSpeechSynthesizer on Mac OS X 10.5 and higher
- sapi5 – SAPI5 on Windows XP, Windows Vista, and (untested) Windows 7
- espeak – eSpeak on any distro / platform that can host the shared library .

5. **Sound output**

When the character is get selected based on recognized sign using speech synthesis, recognized text is converted to speech.
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I. APPLICATION

This project can be used in various places and organizations as an helping hand to the partially impaired people .
Such as:
- Bank
- Consumer Electronics sectors
- Ticket Reservations
- Shopping malls
- Restaurants

- Court rooms

ADVANTAGES :

- No training is required
- Good performance system with complex background
- Successfully recognizes static and dynamic gestures
- Simple fast and easy to understand

LIMITATION :

- The output of the system is only in English Language
- System could not work without camera attached to it as it is an essential part of the system for capturing input.

VII. CONCLUSION

The system will provide an interface that can easily communicate with partially impaired people by Sign Language Recognition. The system is not only can apply in family environment, but also can apply in public. For the Social use these system is very helpful for partially impaired people. We will build simple gesture recognizer based on OpenCv toolkit and integrated it into Visionary framework. As a yes gesture we will mark up and down hand motions no matter which hand is used.

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