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Gesture Recognition using Marathi/Hindi Alphabet

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Abstract: In this paper, we are going to implement communication between deaf-dumb and a normal person have always been a challenging task. Sign language uses different means of expression for communication in everyday life. We propose the Marathi sign language recognition system which aims to eradicating the communication barrier between them by developing a system in order to translate hand gesture into textual format without any requirement of special sign language interpreter. This paper presents a translation system using manual gestures for alphabets in Marathi sign language. At first the objective is to develop a database for Marathi sign language. This sign language recognition system can also be useful for helping two people who know two different languages for the same problem. The output of a system is displayed using speaker and mobile.

Keywords: Marathi alphabets, sign language, hand gestures, web-camera, HSV image, colour based hand extraction, the centre of gravity.

I. INTRODUCTION

Hand gesture recognition (HGR) plays a significant role in any sign language recognition (SLR). Number of deaf and hearing impaired people is very large in India as compared to other countries. Each country has a defined sign language which is used for communication within their community. Researchers are working on various sign language recognition (SLR).

In India, sign language varies from state to state like spoken languages, so researchers are also working on their native sign languages. In the same manner Indian people also use different sign languages for communication, one of which is Marathi sign language. Marathi sign language alphabets contain the vowels and consonants.

When two people are communicating, the body language plays an important role in order to for their thoughts to be understood by another. In the proposed system we are implementing the Marathi sign language recognition. This system is designed to recognize the Marathi alphabets or signs which consist of consonants and vowels. When the hand gesture is recognized the systems will then generate voice and text of recognized gesture.

II. THE EXISTING MODEL

There are various existing models which have been proposed for recognizing sign language through embedded system by translating the hand gesture into a word, through video camera where sign language is captured and stored in a system where this video is converted into bitmap images. Image processing technique is used to recognize signs which then produce sentences from the video.

Four approaches have been used to sign recognition which is skin filtering, feature extraction, hand cropping and classification.

III.PROPOSED SYSTEM

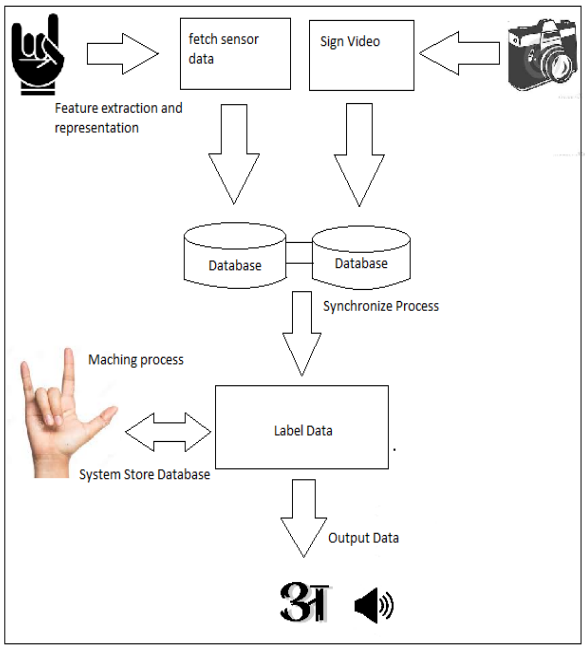

Figure 1: System Architecture

A. SIGN VIDEO

The web camera will capture the input image. When the user gives the input sign it must be in proper form so the detection and processing of an image are easy.

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B. FEATURE EXTRACTION
During the feature extraction phase, various parameters of input or text will be extracted for the recognition. It will include the values of an image stored in the corresponding image or text in the database.

C. PRE-PROCESSING
Pre-processing is done while inputting the text or image. It will include loading the input into the system. The system will then take this input and make it ready for the feature extraction.

D. FETCH SENSOR DATA
Input will be provided using the hand gloves, which is in the form of bending movement of data input which is used to store the input in the database, prepare the database and for the recognition process.

E. DATABASE FOR HAND GLOVES AND IMAGE
Database of image and hand gloves are stored separately at the time of registration process. Database of the video camera are stored in the form of images and database of hand gloves are stored in the form of hand movement.

F. LABELLED DATA
After the comparison process whatever result is produced will be stored in the form of labelled data. This will be used for displaying the final output in the form of text and voice.

G. IMAGE PROCESSING
The sign language recognition done using cameras can be regarded as vision-based analysis system. The idea will be implemented using a simple web camera and a computer system. The web camera will capture the image gesture. The captured image will be then processed for recognition from the database.

H. CAPTURING OF GESTURE USING WEB CAMERA
The first step is to capture the image. The captured image which will be stored in the system windows will also need to be connected to the software automatically. This can be done by creating an object class with the help of high-speed processors available in computers; it is also possible to capture the images in real time by triggering the camera. The images will be stored in the buffer of the object class. Image capturing devices support multiple video formats and hence while creating an image or video input object, we can specify the video or image format that we want the device to use. Image capturing devices use these kinds of files to store device configuration information. The video input function can use this file to determine the video format and other configuration information. The image information function is used to determine if our device supports device configuration files. If the input is an RGB image, it can be of class uint8, uint16, single, or double. The output image is the same class as of the input image. The captured image is an RGB image and hence is needed to be processed before its feature extraction and recognition is made.

IV. PROCESSING

The image captured is an RGB image. This image will be first converted into grey scale because some of the pre-processing operations can only be applied on greyscale images.

Edge detection is an image processing technique used for finding the boundaries of objects within an image. It detects discontinuities in a brightness of the input image. Edge detection is used for image segmentation and extraction in areas such as computer vision, image processing, and machine vision.

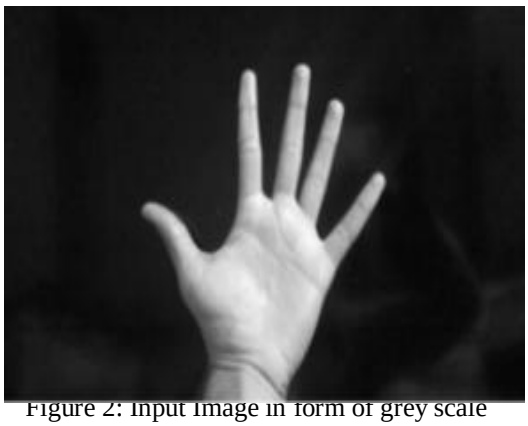
Figure 2: Input Image in form of grey scale


Figure 3: detected finger peaks

V. SYSTEM MODULES

In total two modules will be incorporated as following:

a) REGISTRATION MODULE
The recognition process the image will be captured using the camera and then complete image processing process will be done.

The registration module will be used for storing the information related to the images which are used by mute people.

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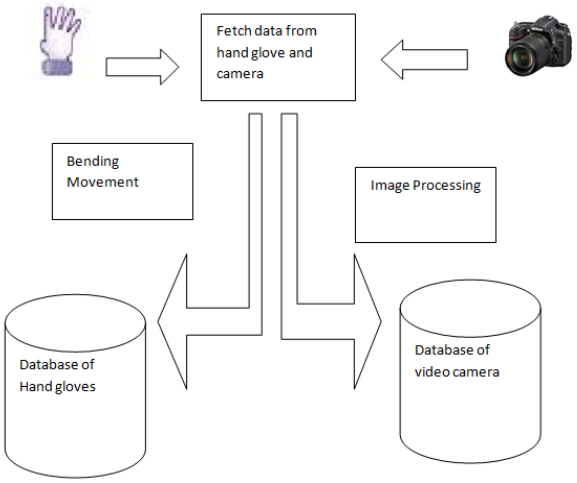

Figure 4: Marathi sign language process registration

The system will track the input from the webcam or video camera and then process this input image. After getting the result of image processing whatever result is produced will be stored in the system database.

b) RECOGNITION MODULE

The recognition process the image will be captured using the camera and then complete image processing process will be done. The registration module will be used for storing the information related to the images which are used by mute people. The system will track the input from the webcam or video camera and then process this input image. After getting the result of image processing whatever result is produced will be stored in the system database.

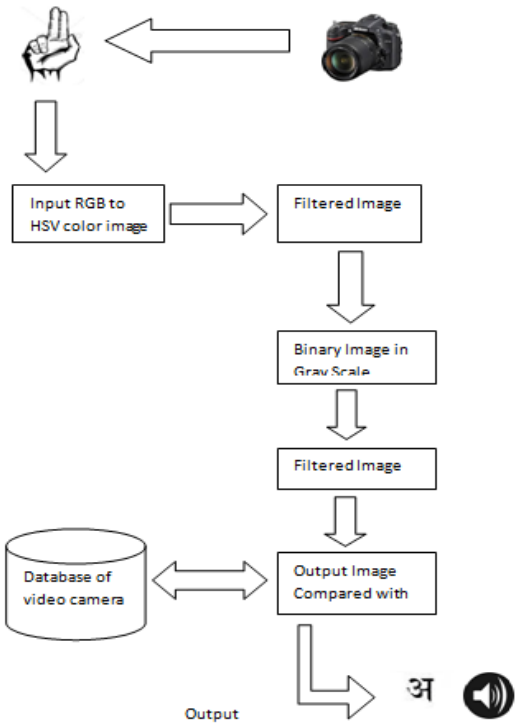

Figure 5: Marathi sign language process recognition

VI. CONCLUSION

This project will prove useful for deaf and dumb people who cannot communicate with normal people due to the lack of social skills. It will also be useful for people who are speech impaired and for the paralysed patients who do not speak properly. People who have limited fluency in sign language can easily communicate with others using the converter that has been proposed in this paper. This converter will recognize the images input by the user and convert them into text and speech. Thus interaction will be simplified between people with or without speech impairments or hearing. For further use, videos of hand gesture that are the previous inputs could be captured and recognized through the implementation of the same algorithm.

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