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HAND GESTURES RECOGNITION CONVERSION TO SPEECH

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ABSTRACT

There are many situations where we need to communicate with the system without touching it due to dirty hands or focus of attention. The alternatives to this are the use of voice based commands or the remote control. By the use of these alternatives we can avoid the spread of infections; it can be used for the purpose of entertainment. It is also beneficial for the people who cannot speak.

This project is a way to develop a optimized algorithm for hand gesture recognition[3]. The algorithm used in our project works in real time. It uses the basic techniques such border detection, filters, and convex hull detection. IT requires only a standard web cam which is used for the recognition of the hand gesture after being correctly recognized the speech file[6] is played corresponding to that gesture.

Key Words: **hand gesture recognition, border detection, filters.**

I. INTRODUCTION

New technologies about which we hear nowadays not only improves our lifestyle but also makes our life easier. Technology has brought the new revolution for the mankind. Research has already been done in various technologies such as Artificial Intelligence, Smart phones and many other. This research has made one's life easier. But not much research has been done for the deaf and dumb people.

Hand gesture is the conventional method which is used for the non-verbal communication**[2][7]**. It is very difficult for the deaf people to communicate with the normal humans**[8][11]**, so sign gesture serves as the means for them to convey their thoughts to the normal humans. This paper represents a system that converts the hand gesture into the corresponding speech and helps the hearing impaired people to communicate with the normal human beings; the two main algorithms that is used are feature extraction and image segmentation.

II. METHODOLOGY

This project consisted of three approaches towards the recognition of gestures which are mentioned below.

II.1 Image Segmentation

It is a process in which we convert a RGB image or gray scale image into binary (Black and White) image. This is done to simplify the image into two objects i.e. black and white image to reduce the complexity of the image. Black with the background and white represents our hand Otsu algorithm is used to convert image into binary. To make the algorithm more efficient we must ensure that the background doesn't denote any part of hand and hand shouldn't have any part of background. By choosing the best possible threshold value we can obtain the most precise result and segmentation can be done according to that value. The selection of the segmentation technique **[9]** mainly depends on the type of image on which we have to do processing and Qtsu algorithms had been tested and work efficiently with our hand gestures data. This method of segmentation can select threshold automatically and do segmentation as it is an unsupervised and nonparametric method of segmentation.

Figure 2(a): Result after mixing RGB and Grey Scale we found Black and white image.

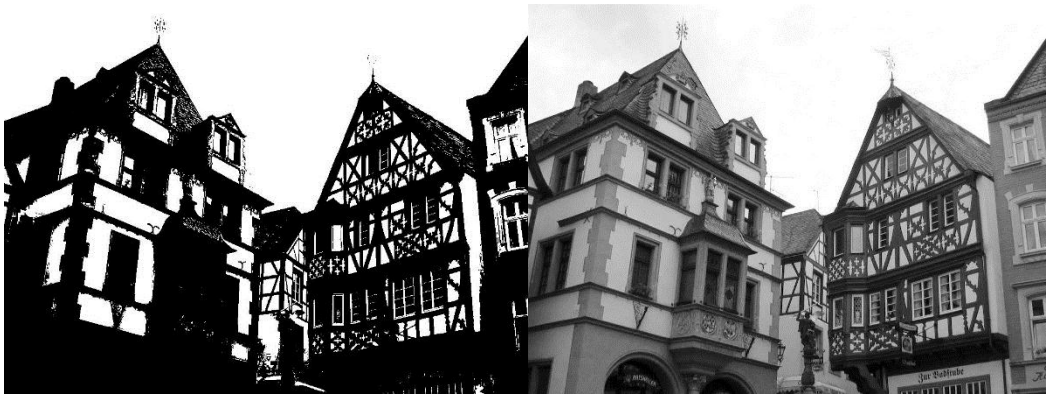


Figure 2(b): Thresholder image and Original Image

II.2 Morphological Filtering

Even after performing the Image Segmentation, the segmentated images are not perfectly processed and further processing is required in those images to remove the unwanted errors and data. Sometimes there are conditions when the background contains some parts of 1's and the hand part contains some parts of 0's. In order to remove these unwanted noise from the segmented image we do morphological filtering. The errors encountered in the image can create a problem in further processing and may lead to poor result as well as may reduce the system efficiency. Hence to make the result more accurate and the image free from noise it is necessary to apply the morphological filtering to get a better smooth' closed and contour of a gesture. The basic operators in morphological filtering are:

- Dilation
- Erosion
- Opening
- Closing

Sample of pre-processing result and the experiments are performed in MATLAB. After the pre-processing we get a smooth and better hand gesture which can results a better efficiency shown in Fig. 3.

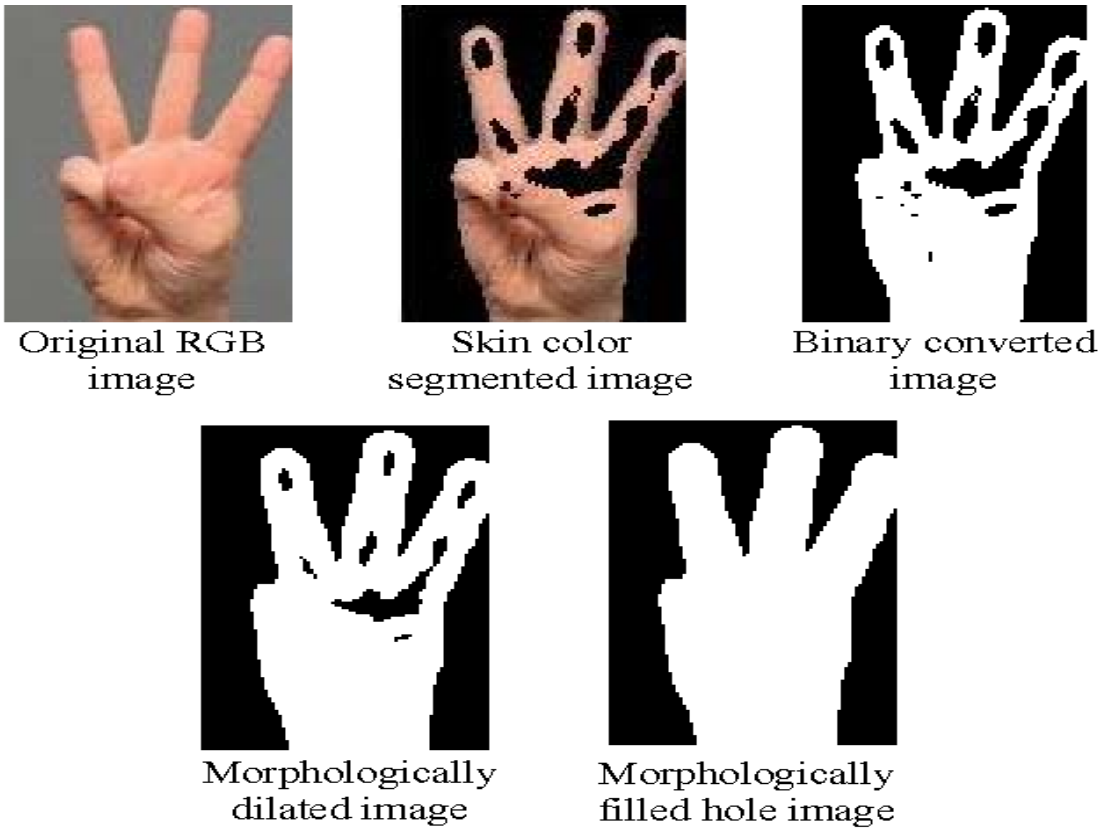


Figure 3: Convert the image from original RGB to Morphologically filled hole image.

II.3 Cross-Corelation Coefficient

After getting the segmentated and filtered image we need to do feature extraction for gesture recognition. There are many methods for feature extraction and matching but the method which we used in our project is Cross Correlation Coefficient. The convolution of two functions is as much similar as Cross correlation. It has many applications in Pattern Recognition that is why we made use of this function for hand matching and recognition of gesture.

III. APPLICATIONS

GSM & GPS: The system can used in smart watches and portable devices to send emergency signals via GSM by making use of hand gestures. It can also be helpful for getting the precise location of any place by assigning the specific functionalities to the gestures which can be implemented with the help of smart devices like smart watches as well as smart phones.

Human voice module: System makes use of systematized voice which is implemented with the help of speech module but in order to make the virtual communication between people more realistic, we can make use of human voice at the place of systematized voice. This makes the words more clear to the local people as it can use any human voice as the sample to the output of all the speeches assigned to each gesture.

Entertainment : It can also be used in the upcoming smart televisions having web cams. Many a times we are not able to find the remote to perform specific task on tv. Hence, our project can also be used and each gesture can be assigned a particular function to operate from a distance without making use of remote.

IV. CONCLUSION

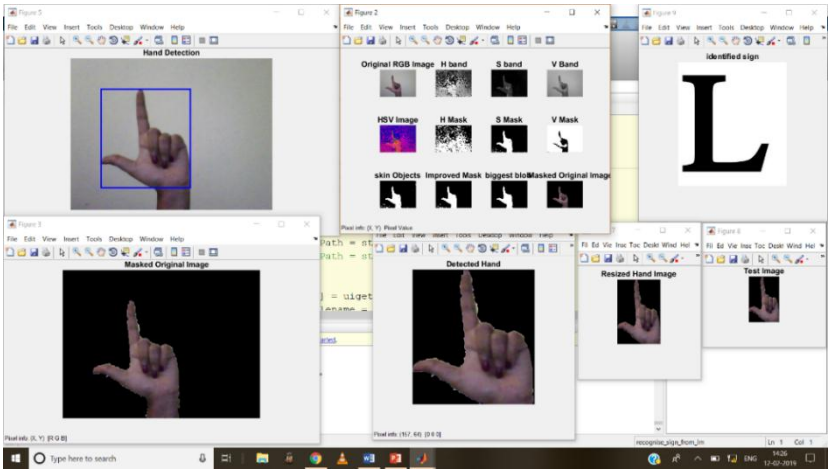
The aim of the project is to bridge the gap between the deaf community and the standard world. The methodologies used in the project interprets the sign language into the speech. The project reduces the difficulties of dumb people. In comparison to the existing system our project arrangement is portable and more compact.

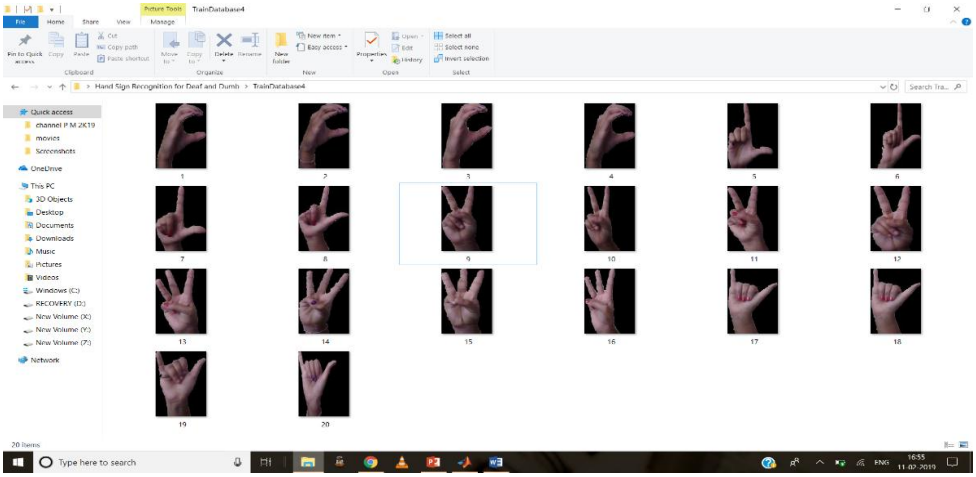
This system describes the design and working of a system which is useful for dumb, deaf people to communicate with one another and with the normal people. The dumb people use their standard sign language which is not easily understandable by common people and dumb and deaf people cannot see their gestures. This system converts the sign language into voice which is easily understandable by dumb, deaf and normal people. The sign language is translated into some text form, to facilitate the deaf people as well.

By implementation of this system, we can help people who cannot speak and they can also talk with gestures and speaker. It also reduces the use of smart gloves and cuts the cost of any particular hardware device. Just a laptop and application is enough.

V. RESULT

Through sign languages we can communicate without the help of acoustic sounds. Sign language uses sign patterns such as body language, movement of hands to develop the understanding between the people etc.Learning of sign languages requires the special training, so this research paper is useful to bridge the gap between the deaf and dumb people and the people who can understand their language. The main result of the project is to correctly recognize and respond to the gesture accordingly.





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