

Hand Gesture Method to Speech Conversion using Image Segmentation and Feature Extraction Algorithm



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Abstract: Hand gestures are used by the speech impaired persons to easily communicate with others. Hand gesture is a visual language, different from spoken language but serves as the same purpose of spoken language. Image segmentation and feature extraction algorithms are used to recognize the hand gestures of the deaf people. In this paper the proposed system will not only recognize the hand gestures but it will translate into suitable messages by using skin color segmentation. With the help of speakers speech playback is possible in the MATLAB.

Keywords: Hand gesture recognition, Skin color segmentation, Speech playback.

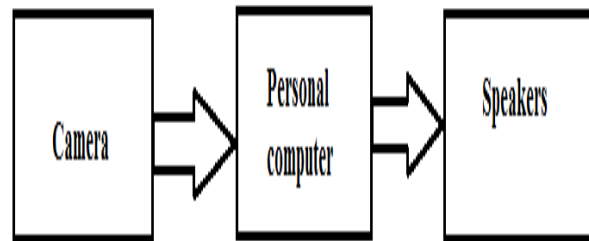


Fig 1. Proposed system Block Diagram

From the figure camera is a first functional block used to seizing of images in motion. The personal computer is second and main functional block. From this only we can easily complete image processing. The output of the computer is in the form of gestures and the corresponding speech is played through the speakers.[3]

A). The proposed Algorithm

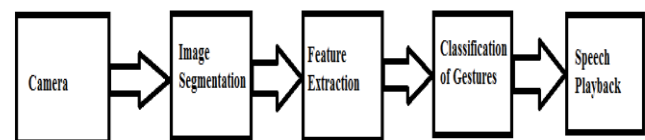


Fig 2. The proposed algorithm block diagram

This is the proposed system block diagram consists of several stages the figure shows the camera it is used to capture the gesture images.

I. INTRODUCTION

Gesture recognition is a topic in computer science and language technology with the goal of interpreting human gestures via mathematical algorithms. Gestures can originate from any bodily motion or state but commonly originate from the face or hand. Every human being has it's own style to communicate with others. Common men will communicate their feelings, emotions and ideas to others through speech. Gesture language is the only way for the impaired persons to communicate with the normal people. The speech impaired persons have developed many ways and hand gesture is one of the method o communicate with the normal persons. Instead of conveying their emotions, feelings, thoughts and ideas through speech they convey it through the hand gestures. [1 Hand gestures are visual language different from the spoken language but serves as the same function. This paper helps for people who cannot see and this work converts the corresponding gesture into speech. It is developed for the hearing impaired or deaf people to communicate with the normal people very easily.

II. SYSTEM DESIGN

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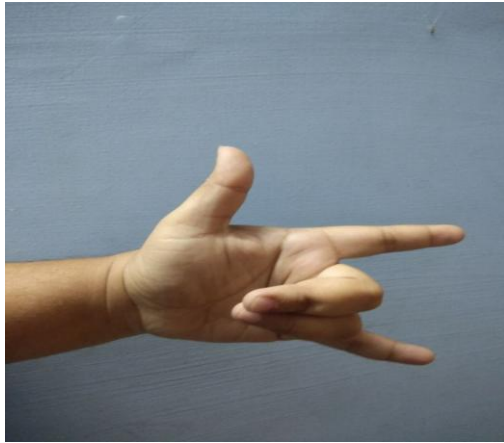


Fig 3. Input Image

The detection of skin color and region segmentation is performed during the segmentation stage. RGB color space, cbr color space, HS color space, Normalized RGB & HSV are skin color segmentation techniques. From these values the skin color is detected. The RGB values lies in between a boundary for skin pixels and it varies for non-skin pixels. With this RGB ratio we can identify whether the skin pixel belong to the skin region or not. Skin region detection algorithm is applied for each gesture and it is applied to skin region to find the color.

B) Feature Extraction

In this section we will calculate the center of region(COR) and also the far away point from the center of region. COR can be calculated as:

$$x = \frac{\sum_{i=0}^k xi}{k} \quad \text{and} \quad y = \frac{\sum_{i=0}^k yi}{k}$$

Where xi and yi are coordinates. We will calculate the far away point from the region. After this calculation of the far away point from the region we will draw a circle of radius 0.7 with center as COR.[2] The fingers touching this center of the circle are considered as the active fingers and the person can easily recognize that how many fingers are outstretched.

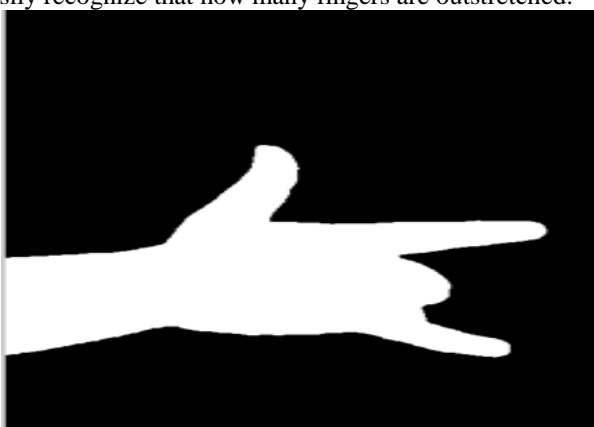


Fig 4. Skin segmented image

1D binary signal is extracted by tracking and white portions of the signal is calculated from the figure 4.

C) Classification of Gestures

The midpoints play a very important role. The centroid is very crucial to join midpoints so that we can form individual line segment.[4] In each and every image wrist segment is very active. Hence it is treated as a reference segment. We can observe that all the fingers will make a different angle with the

wrist.so as every finger makes a different angle with wrist it is easy to identify that which finger is outstretched. With the help of wrist line calculate the angle of each individual segment. Depending on this angle fingers are identified. [5] The count of fingers that are active is determined by the midpoints that are plotted. After fingers are identified, the gestures also be recognized by the set of fingers obtained.

D) Speech Playback

After finding the matched data, pre-recorded voice signal will send and it is saved in the current folder, with the help of speakers speech playback is possible in the MATLAB.

III. RESULTS

The simulation results of the code is executed in the MATLAB software and the following outputs are obtained.



Fig 5. Input Image

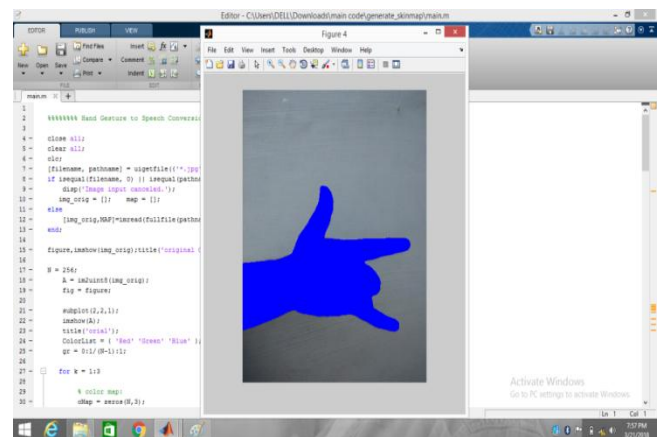


Fig 6. Processing Image

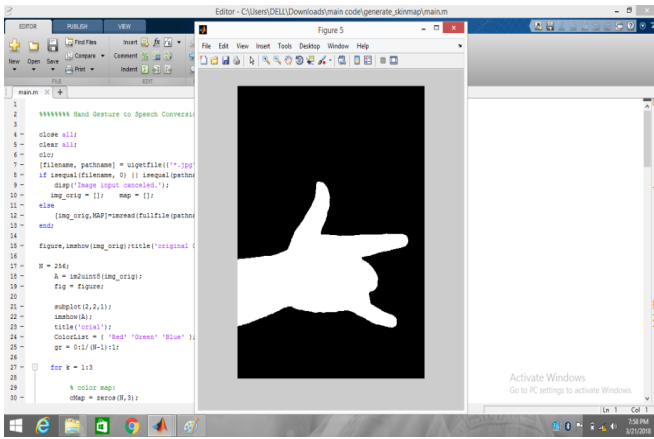


Fig 7. RGB to YCbCr conversion Image

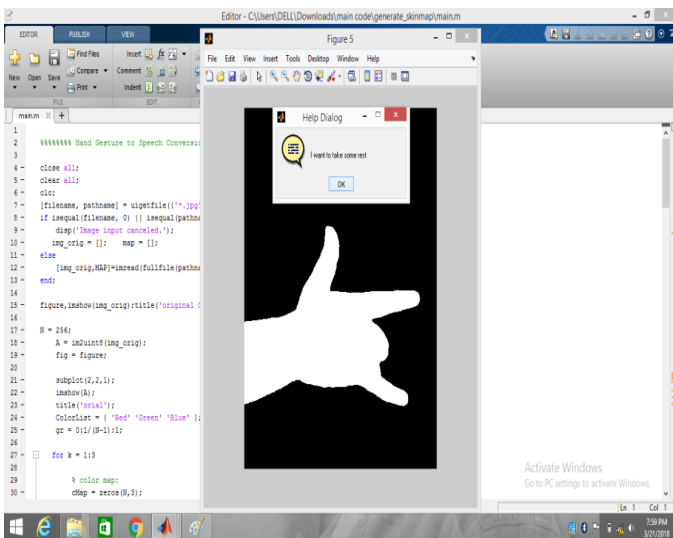


Fig 8. Hand Gesture to Speech converted image

IV. CONCLUSION

A simple system is developed for the speech impaired persons to communicate and to express their ideas, thoughts, feelings to the normal people. This system not only recognizes gesture indications it develop speech system. From the results we can obtained accuracy upto 80%.

V. FUTURE SCOPE

Deaf people can make use of this system to communicate. The person can simply use the hand movement to convert it into a text message which is further displayed on the screen. This method can also be used to control mouse operations using the prescribed hand gestures that can be handled using the MATLAB commands.

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