Mouse Operations Using Face Gestures

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Abstract : Nowadays, people try to make more appropriate functional device for differently abled person. In this modern society, how to combine technology with functional devices has become a popular issue. However, functional devices of hand impaired person for using computer is not addressed much. Therefore, to make the functional device for whom who are unable to use mouse is the objective of this paper. In this paper, we will discuss about Mouse operations done using face gestures. The images of mouth moving are captured into computer by webcam, and then we can control cursor and click by moving mouth. Using algorithms like template matching algorithm and haar classifier.With the technological advancement, we can surely improve living quality of differently abled people especially hand impaired person.

IndexTerms **- face gestures; mouse; functional device.**

I. INTRODUCTION

In recent years, the development of technology has been greatly encouraged by the application and advancement of computers. Take biological technology for example. The range of human's observation to the extent that we have been provided with endless opportunities to increase our awareness and knowledge of many aspects in our life has been extended by the Computers' powerful calculating abilities.

Thus, we should use various parts of body to control computers rather limiting usage to only to the hands hence we have decided to apply a simple operation of computing to create this experiment. Windows are installed in most of the computers, and Mouse plays an important role in using this software. Therefore, our plan is to use the human's face gestures to control the mouse. The mouse mostly controlled by hands, is not really appropriate to many disabled people. As a result, we have visualised using other parts of our body in substitution for hands or to help hands to control computers. We have considered several factors, and most importantly, hands and feet are not available for most of physically disabled people. Hence, we have decided to control mouse by face gestures using face recognition.

In this experiment, the most important task is identifying the shape of the mouth and to judge when the mouth is shut. To test this, we created a in-ordered process. First, we captured the webcam images and then reverted them, then removed colour noise, then we applied various detection and treatment, identification. With a view to the user for easier use we are able to move the mouse. A brief description of the system is that at the beginning, the webcam transfers the image to the program in the computer that deals with replacement processing. Then a comparison of the images from the identification system to that of the real person is to be done .The RGB image which is original has to be converted into HSV, the default threshold of HSVis used to get the location of mouth, whereas erosion and dilation are used to remove the color noise. Finally, using their mouth the user finds a way to connect to and position the location of the cursor, a final analysis of the mouth-type will determine when the 'click' function is applied. (REFERENCE-C)

II. RELATED WORK

Recently, the research in the area of functional device which integrated computer science is becoming more and more. In a conventional keyboard, like a QWERTY keyboard, there are many keys where spaces between neighbouring keys are too small for differently abled people, Sheng-Wen Shih and Chan-Hao Huang proposed a novel prosthetic keyboard which had less number of keys such that the space between neighbouring keys is sufficient for differently abled or disarmed people. Every character was encoded by using radix-12 Huffman algo, by the keyboard that was designed which had only twelve number of keys. Using three different methods,the performance was tested.The Huffman method can help the physically disabled person to type more words per minutes than other two methods. (REFERENCE-B)

III. PROPOSED MECHANISM

The purpose of this paper is to find the position of mouth and to identify the shape of an opened and closed mouth. Shape of the mouth was identified by obtaining the image which was captured by the. The following is the working for our system: After the system begins, the system changes the positions of images from left to right; because the image taken by a webcam is reverted to the real person. , the system changes the RGB image into HSVs, with the default setting of HSV to find the position of mouth. The system uses erosion and dilation to erase the stains, and then connects with the webcam to locate the user's mouth. Finally, the system can locate the position of cursor, and then analyse the shape of mouth to identify when the users 'click' the Mouse.

3.1. FLIP LOADED IMAGE

The image captured from webcam will be inversed from user's view. So, we need to flip the loaded image to make it appear like a mirror of the users on the screen. To flip an image, we need to know the width of the image, and then make a flipped image.

3.2. HSV COLOUR SYSTEM

First of all, we use the RGB pixel number to find the range of RGB pixel number for the mouth.

However, the RGB color system is easily intermittent with a great influence of light source. As a result, two similar colors could have different RGB numbers, and the difference in lighting can greatly influence the color of the lips. So, we locate the mouth on HSV color space, which H stands for Hue, S stands for Saturation, and V stands for Value. The conversion is from RGB to HSV. The RGB value is between decimal 0 to 1, and conversion from 0 to 255. Information from the HSV color map shows HSV color is more continuous and less susceptible to the effects of brightness. It's easier to set a specified set of specific HSV, and the results have less noise

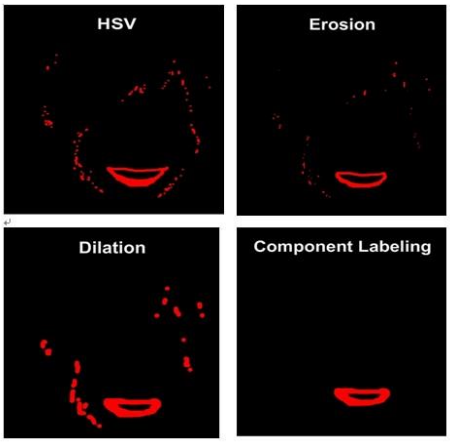


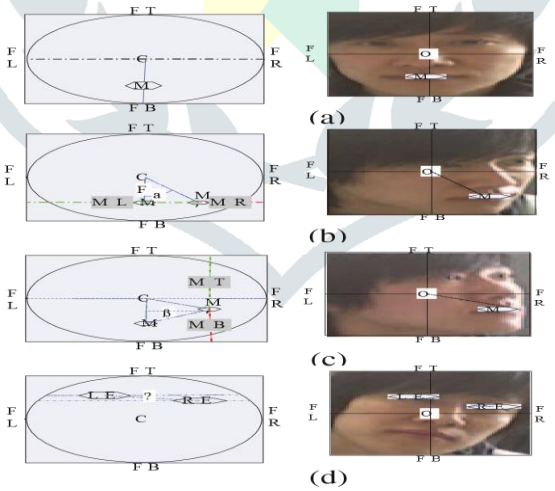
figure no-1 result of various steps

3.3. EROSION AND DILATION

Although using the results of HSV better than the use of RGB, there still is some noise. The proposed method, erosion and dilation, is the method we have applied to achieve the removal of the effect of noise. First, we use Erosion to filter out the smaller noise, but the scope of mouth will also be affected by deformation, so it's necessary to use Dilation to recover the mouth. In addition, usage of Dilation and Erosion once is the most efficient. A comparison for the steps is then used to find the largest set, the part we want.

3.4.MATRIX MATCHING ALGORITHM

3.4.1 Find the minimum number in each row and subtract it from all elements in the row.
3.4.2 Find the minimum number in each column and subtract it from all elements in the column.
3.4.3 Cover all zeroes with minimum number of vertical and/or horizontal lines.



If the number of the lines is N, then we have found our assignment. Otherwise, find the minimum uncovered number, subtract it from all uncovered numbers and then go back to step C. (REFERENCE-D)

figure no-2 centroid detection

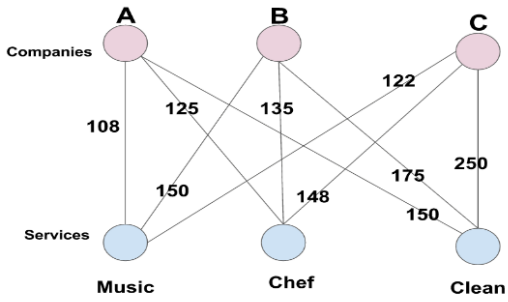


Figure no-3 Example

IV. EXPERIMENTS & DISCUSSIONS

Fig 4 shows the program interface, there are six subwindows and adjustment buttons in the program. The upper sub-windows are mirror, HSV, erosion, dilation and mouth image respectively, the lower sub-window is the image of webcam. The adjustment button adjusts appropriate value of HSV threshold.

We evaluate the performance of mouth-controlled mouse through two experiments. One is to draw a square (6cm*6cm), and we record the spending time. Further the spending time of mouth-controlled mouse is 5.77 times of the hand-controlled mouse. Cursor moves faster than the hand.

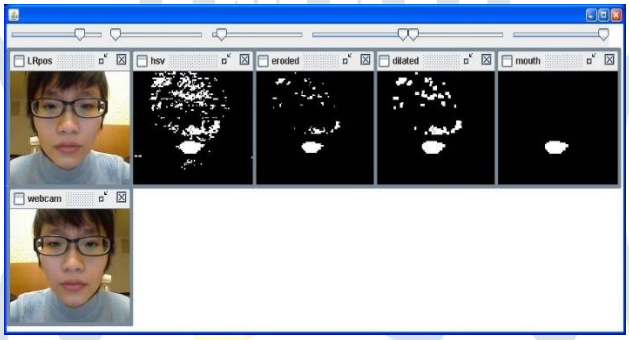


figure no 4 . the program interface

Although we can detect if the mouth is open or not, there are several problems need to be improved. First, the system may identify the whole mouth as upper lip or underlip. Secondly,When various objects appear such as another mouth, fringe,and light reflected by the spectacles glasses, the system may also fail to identify the mouth shape These may affect the detection result, even the clothing that user wears may cause an error.The accuracy of mouth opening is greater than mouth closing The accuracy is more precise when mouth is not moving, whether users opens mouth or not, thus we see the detection result is susceptible to mouth moving. (REFERENCE-E)

V. CONCLUSIONS

In this research, we have controlled the cursor and click functions, which are the two main functions of mouse. An attempt to develop a gesture recognition system using open CV – C# is done to develop a communication medium for the physically disarmed people. By using this system, the person who is performing the gesture would be able to operate mouse , as the system is going to record the gestures and compare it with the stored template and then perform the given mouse operations. Our final objective is to develop a system which can achieve all of mouse functions such as: mouse drag, mouse wheel scroll to upper and scroll to down. And also human eyes motion can be used to control mouse movement and event information. In the future, we hope that this technique can be developed to be widely used in any public computer and help disable people use the computer appropriately. (REFERENCE-B)

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