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RESEARCH ARTICLE

Implementation of Mouse Control System Using Head Movement

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Abstract

This system can be adapted accurately for detecting facial features. It is a free line up that allows a physically challenged user to control the pointer of the mouse on a processor with the help of head movements. The movements of head are liberated clicking with the help of mouse pointer abide over a spot on the screen. This is application which is helpful for the people who are disabled. The foremost spectators for this program are people who do not have committed control of a hand but who can only move their head. Citizens with, Spinal Cerebral Palsy, ALS (Amyotrophic lateral sclerosis), Muscular Atrophy, Traumatic Brain Injury, Multiple Sclerosis, various neurological disorders use this program and its predecessor to run all types of processor software.

Keywords— HAAR algorithm, image processing, image extraction

I. INTRODUCTION

In this paper face detection is done with the help of HAAR algorithm. The face detection algorithm looks for specific HAAR features of a human face. When one of the requisite features is found then the algorithm allows the face of the user to pass it on to the next stage of the detection. A face of the user is considered as rectangular section of the original image which is considered as a sub-window. The size of the sub windows is fixed. This sub-window is frequently scaled in order to achieve a variety of different size faces. Then the algorithm scans the whole image with the help of the window and denotes each particular section of the face of the user.

II. LITERATURE REVIEW

Face detection which is proposed by Viola and Jones is most accepted among the face detection approach based on marker (statistic) methods. By using high performance computers the real-time faces can be detected, the resources of the system are likely to be controlled by the face detection. The algorithm that is the face detection algorithm which is proposed by Viola and Jones is used as the basis of the design. The specific HAAR

features of a human face are gazed with the help of this algorithm. When one of these features is found, then the algorithm allows the face of the user to pass it on to the next stage of recognition/detection. Generally the size of the sub-windows are fixed, typically it is of 24*24 pixels.

The face detection algorithm proposed by H. Schneiderman and T. Kanade is used as the basis of our design. The face detection is done with respect to the weights of the images and then the results are summed. The area of each rectangle is easily found using the fundamental image. The match of the any corner of a rectangle can be used to get the sum of all the pixels above and to the left of that location using the integral image.Since L1 is subtracted off twice it must be added back on to get the correct area of the rectangle. The area of the rectangle which is symbolised by R is denoted as the rectangle integral, can be calculated as follows using the locations of the integral image [2].

A HAAR feature classifier uses the rectangle integral to calculate the value of a feature of the image that is captured. In the HAAR feature classifier the weight of each rectangle is multiplied by its area and the results are added together. The numerous HAAR feature classifiers comprise a stage. A stage comparator then sums all the HAAR feature classifier results in a stage and compares this abstract with a stage threshold. The face detection algorithm eradicates face users quickly using a waterfall of stages. The waterfall (cascade) eliminates the users by making firmer necessities in each stage with the later stages being much more difficult for a user to achieve the authorization. Users exit the waterfall if they pass all the stages or fail any one of the stage of the waterfall(cascade) .The face of the user is only detected when the user passes all the required stages[3]. The frontal upright faces in a wide variety of images can be successfully detected using various numbers of technique . Some systems can clearly report non-upright face detection [4].

III. PROPOSED SYSTEM ARCHITECTURE

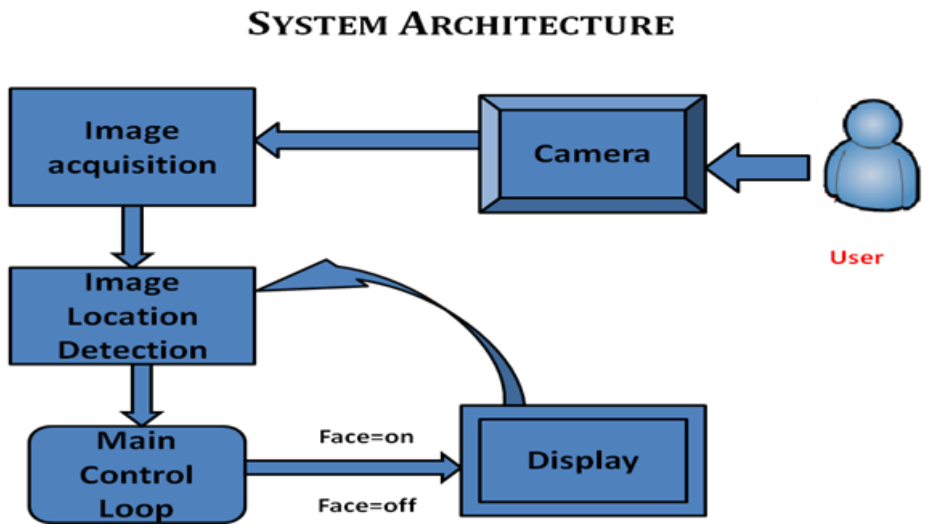

Fig.1 System Architecture

An input window is assessed on the first classifier of the waterfall (cascade) and if that classifier returns to be false then calculation on that window ends and the detector returns as false. If the classifier returns as true then the window is passed to the next classifier in the waterfall. The next classifier assesses the window in the same manner. If the window passes through each classifier with all returning as true then the detector returns as true for that window. The more classifiers are evaluated on it and then the longer it will take to classify that window when more the windows looks like a face. Since most windows in an image do not look like faces, utmost are quickly discarded as non-faces. The overall algorithm for the detector is as portrayed in the figure.

IV. WORK FLOW

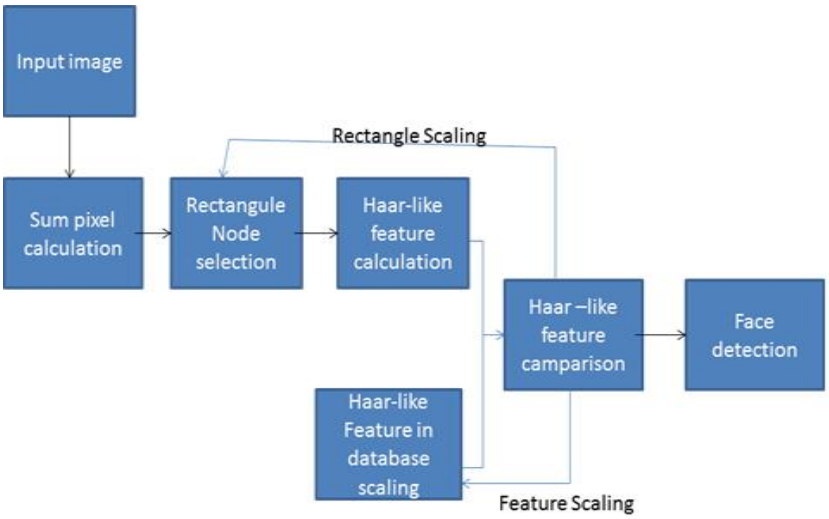

Fig.2 Flow diagram of Image location detection and processing

In this flow of work it get first input image from user who have sit at front of camera. Working with only image intensities (i.e., the RGB pixel values at each and every pixel of image) made the task of feature calculation expensive. The HAAR-like feature considers neighbouring rectangular regions at a specific location in a detection window, then it sums up the pixel concentrations in each region and then the difference between the sums will be calculated. After calculating the difference it is used to categorize the subsections of an image. For example, let us consider that we have a database of images with the human faces. It is a common observation that among all the faces the region of the eyes is darker than the region of the cheeks; therefore a common HAAR feature for face detection will be a set of two adjacent rectangles that will lie above the eye region and the cheek region. The rectangles position of these will be defined comparative to the detection window that would be acting like a bounding box to the target object.

In the detection stage a window of the target size is stimulated over the input image, and for each subset of the image the HAAR-like feature will be calculated. Then the difference will be compared to a learn threshold that separates the non-objects from the objects. Because such a HAAR-like feature is only a weak learner or classifier (the detection quality is somewhat better than arbitrary guessing). A large number of HAAR-like features are very much necessary to designate an object with adequate precision.

For the fast calculation of value of pixel has used sum area table, which they called integral image. Integral images also know as two dimension lookup tables in the form of a matrix with the same size of the original image. every element of the integral image containing the sum of all pixels position on the up-left area of the real image.

V. SOFTWARE TECHNOLOGY

a) Development tools:

C# technology is used to this system. A toolbar is implemented to perform all the controls of mouse .To detect face of user who sit in front of camera and according to the movement of head the mouse pointer will moves, C# .Net technology is used.

b) Operating system:

Microsoft windows or higher.

c) Camera

In this system a web camera minimum 1.2mp is used to detect the face of user .

VI. METHODOLOGY

HAAR Algorithm

In HAAR algorithm we are going to used it for detect the face using HAAR algorithm .how it work we will seen following.in working with only image intensities (i.e., the rgb pixel values at each and every pixel of image) made the task of feature calculation computationally expensive.in this idea has adapted of using HAAR wavelets and developed the so-called HAAR-like features. a HAAR-like feature determined adjacent rectangular areas at a proper location in a detection window, adding all the pixel intensities in each region and calculates the distinction between these addition. this difference is then used to categorize subpart of an image. for e.g, let us tell we have image database with human faces. it is a common examination that among all faces the area of the eyes is black darker than the area of the cheeks. therefore a HAAR feature for face detection is a set of two adjacent rectangles that stretch out above the eye and the cheek area. the position of these rectangles is defined pertaining to a detection window that acts like a bounding box to the specific object.

A window of the intention size is moved over the input image, and for each subparts of the image HAAR-like feature is sum up. this difference is then compared to a learned threshold value that separates objects from nonobjects. because such a HAAR-like feature is only a weak expert or classifier (it is detection quality is to some extent better than random guessing) a large number of HAAR-like features are necessary to describe an object with adequate accuracy. the viola-jones specific object detection framework, therefore organized in something called a classifier flow to form a strong learner or classifier.

In speedy computation HAAR like feature one of the assistance of viola and jones was to use summed up area tables, which they called integral images. integral images is to defined as two dimension lookup tables in the form of a matrix with the equal size of the original image. every element of the integral images contain the addition of all pixels located on the up-left area of the original image (in relation to the elements location). this allows to compute sum of inside of rectangular areas in the image, at any location or scale, using only four lookups:

So if A[x,y] is the original image and AI[x,y] is the integral image then the integral image is computed as shown in equation 1 and illustrated in Figure 3

$$AI[x,y]= \sum_{2\text{-rectangle}} A_{3\text{-rectangle}}(x,y)$$

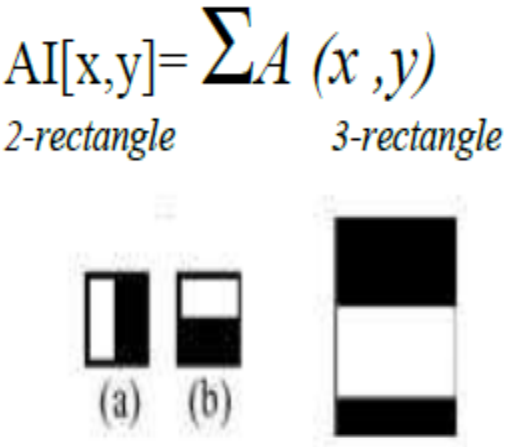

Fig.3. Comman HAAR features

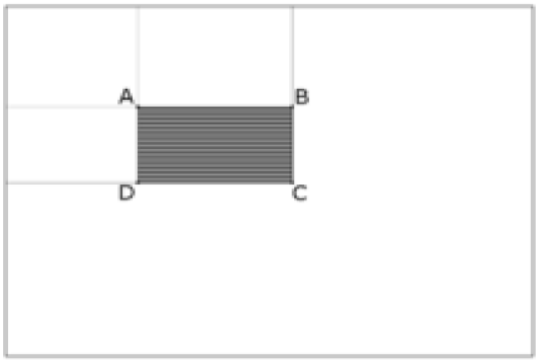

Fig 4: Finding The Sum Of The Shaded Rectangular

VII. RESULTS

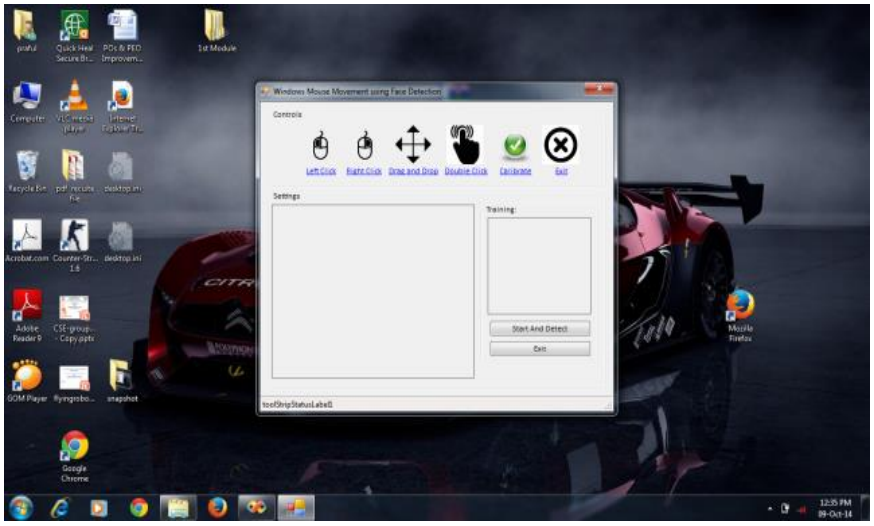

Figure 6. User Interface of the system to move the mouse

In figure 6 the user interface of the developed system is shown in which a toolbar is displayed on the desktop where all the icons are present for the movement of the mouse pointer.

Fig 7. Result of face detection

Figure 7 shows the detection of face through the camera and mouse pointer. After the detection of the face location the mouse pointer will move according to the movement of head and user can perform the operation of mouse like left click ,right click ,double click.

VIII. CONCLUSION

This developed system is able to the features of the image given through movement and it can classify it in appropriate category based on the feature vector matches found in the database. Also it is able to retrieve number of images as user want from the database. In this system a HAAR algorithm is implemented in C# .Net .Through this developed system physically challenged people are able to use computer with their head movements.

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