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A Smart Application for Generating Acoustic Signal for Blind People

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ABSTRACT

Visionless people face many difficulties in their daily activities like recognising objects. We describe how to model the appearance of an object using multiple views, learn such a model from training images, and recognize objects with it. We know that they require someone to explain them the scenerio of environment due to this blind people became dependent on others. This paper is basically designed to facilitate blind people for autonomous navigation. It is based on 'image to sound' conversion. The mobile camera is used to captures the image in front of the blind user. This image is then equated with the database and the processed information is fetched by blind user through a set of earphones. Color information of the object is also measured and it is informed to the blind user through the set of headphones.

Keywords: **Color identification, edge detection, gray scale, object identification Introduction.**

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I. INTRODUCTION

According to World Health Organization, there are many blind people over the world. Day by day the count of blind people is increasing. Numerous problems are faced by blind people every day with navigation and finding objects. Blind people can't identify the object or barriers in the environment, so for them navigation is restricted. In image processing, to identify the color of an object in image, it is necessary to separate the object from the image by removing background of that image. If the background remains in image it produce incorrect output. To capture the particular object from image, initially we have to determine where the object is located specifically in the image. By mobile camera, the scene in front of visually impaired people or blind user is captured and it is converted into human audible sound. This sound heard by the blind people through headphones.

II. LITERATURE SURVEY

Blind people face many problems performing their day to day activities with navigation and finding objects. There are many technologies that support blind people, visual impaired and other physically challenged; e.g. scANNERS FOR BLIND PEOPLE, REMOTE controllers for physically challenged people and facsimile devices for deaf people. The previous developments related to navigation for visually impaired people have been well covered in historic period. One of the most recently development in IEEE by R. Nagarajan (2001) et.al.have been proposed.

A. OBJECT CAPTURING

Camera used for experimentation purpose is "iballface2face, a USB webcam, with 640 by 480 resolution and64M color depth. A Night-Vision Camera and camera with different resolution and color depth can be used depending upon requirement of application. Camera is fixed on the system and should not move from its place once background image is captured, otherwise it will adversely affect accuracy of the system as subtraction is used to detect intruding object.

Fig.1 Captured Image

III. FLOW OF SYSTEM

The image is captured via mobile camera and then grey scale algorithm is used to convert this image into 8 bit format. After this, edges of the image are measured through edge detection algorithm. Blurring technique is applied to remove the Gaussian noise from the image; due to this the image becomes more accurate. The actual object is separated from the background by boundary detection and blob detection algorithm.

The object is now cropped and converted into HSV .Image histogram is used to plot the graph of object. This histogram is stored into database. When the camera captures an object, it is compared with the histogram which is stored in database. If the object matches with the database then sound is produced.

Once an image is captured, it is necessary to separate it from background. This object can be separated by using following techniques. The following techniques describe the way in which the object is identified and separated.

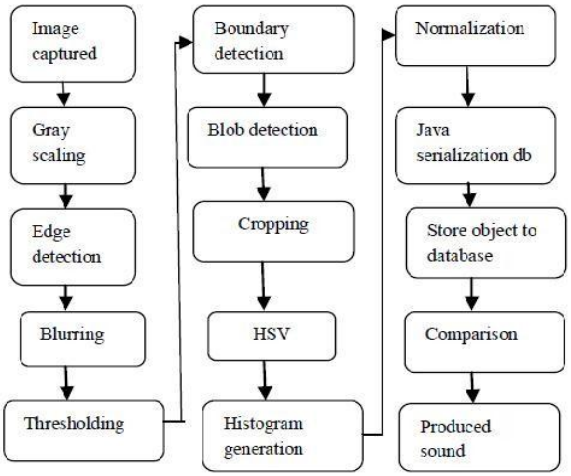

Fig 2. Flow Of System

IV. SYSTEM ARCHITECTURE

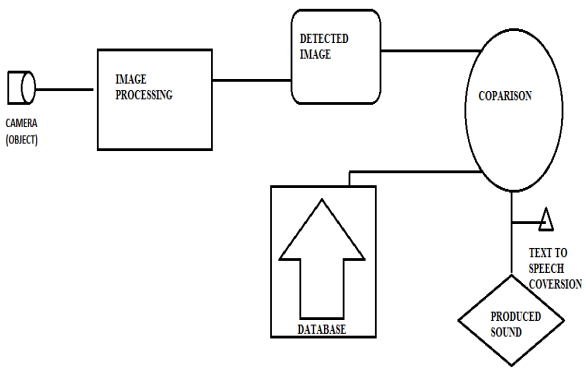

Fig.4 block diagram

The figure contains main function of the system including the database system. First thing is to collect an image after this image processing in done on that image. Methods like gray scaling, edge detection, blurring, blob detection etc done on the image. Then after comparison of detected image with the image stored database. Similarly after normalisation with help of text to speech conversion the sound will produced.

A. EDGE DETECTION

In Edge detection the edges of image or object are detected. Edge detection is one of the mathematical methods used for identifying the points in an image at which the image brightness changes sharply which are typically organized into a set of curved segments called as edges.

First step in edge detection is, all the edges of the images are found by analysing the adjacent pixel in colour. Second step is that the object is in the centre of the image and from the edges of the image the pixels are made transparent and that object moving towards the Centre until and edge is reached. This edge detection method eliminates an image with a transparent background and object in the centre.

Fig 3: Original image with its Derivative and Laplacian image.

B. BLURRING TECHNIQUES

Blurring means that each pixel in the source image gets spread over and mixed into surrounding pixels. Blurring an image reduces the sharpening effect; this makes the detection more accurate. Here, grayscale blurring technique will be used to blur the image. Mathematically, applying a blur to an image is the same as convolving the image with a Gaussian function. The equation of a Gaussian function in one dimension is, G(x) = 1/ 2no e^− x2 2o2 Equation for two dimensions is the product of two such Gaussians, one in each dimension, G(x, y) = 1/ 2no2 e^− x2+y2 2o2 Here, x is the distance from the origin in the horizontal axis, y is the distance from the origin in the vertical axis, and σ is the standard deviation of the Gaussian distribution. When the formula is applied in two dimensions, it creates a surface whose contours are concentric circles with a Gaussian distribution from the Centre point; values from the distribution are used to build a convolution matrix which then is applied to the original image. The value of each new pixel having new value is set to a weighted average of that pixel's neighbor. The value of original pixel receives the heaviest weight and neighbor pixels receive smaller weights. Hence, the distance to the original pixel increases. This results in a blur which preserves boundaries and edges.

C. BLOB DETECTION

Blob detection involves scanning of image for the pixels and compares them with adjacent pixels for finding the group of

same colour pixels. The group of same colour pixels adjacent to each other is called the blob of pixels.

A separation of particular object from the captured image is done in the cropping. By using blob detection technique, the particular object is identified from the image. After detecting the blobs in the image, by finding the maximum and minimum values of X and Y for particular blob, we store each blob of pixels into the separate vector. There is a separate vector for each blob in the image.

D. COLOUR IDENTIFICATION

Color is an important factor in daily life of human being which plays a vital role in communication and recognition. HSV:HSV is strong model than RGB because it offers a more sensitive representation of the color. It selects more specific color from the color wheel. In HSV model, if the value of 'V' changes, value of 'H' and 'S' remain constant, but as we made change value of 'V', value of RGB changes.[2] H (hue)- Specify the position of pure color on the color wheel. S (Saturation)-Describe the how white the color is. V (Value)-It shows 'lightness of color'. It represents the intensity of color (brightness in the color). The below diagram represents HSV coordinate system model. [2]

Set pixel in image again Esle
//finding saturation
Find saturation=255 * (Max-Min)/value If saturation is zero then
Assign hue is zero Set pixel
End if Else
IF max equal to R then
//finding Hue
Hue = 0 + 43*(G-B)/(max-min) End if
If max is equal to G then
Hue = 85 + 43*(B-R)/(max-min) End if
If max equal to B then
Hue = 171 + 43*(B-R)/(max-min)
End if
If hue<0 then
Hue=hue+255

End if End if
7.Set each pixel again on image 8.End

E. HISTOGRAM

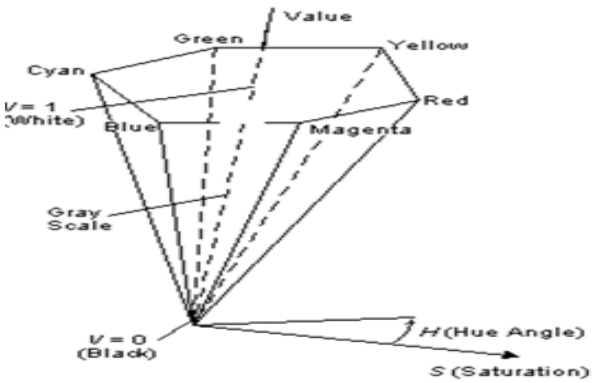

Fig.5 HSV cordination system module Conversion of RGB to HSV

1.Capture image and load 2.Read each from image
3. Separate RGB color for each pixel R = col & 0xff; G = (col>>8) & 0xff; B = (col>>16) & 0xff;
4. Find minimum value and maximum value of Red,Greenl,Blue
5. Assign max to value
6. If value equal to zero then Assign hue=saturation=0

An image histogramis a type of histogram that represents the tonal diffusion in a digital image. Histogram technique is applied to place the number of pixels for each tonal value. By watching at the histogram for a specific image an observer will be able to recognize the entire tonal distribution at a scan. The vertical axis of the graph represents the number of pixels in that precise tone and horizontal axis of the graph signifies the tonal deviations, whereas the left side of the horizontal axis shows the black and dark areas, the middle part represents medium grey and the right hand side represents light and clean white areas. The vertical axis shows the size of the area that is captured in each one of these zones. Thus, the histogram for a very dark image will have the wide data points on the left side and centre of the graph. In oppose to this, the histogram for a very bright image with rare dark areas and/or shadows will have most of its data points on the right side and centre of the graph. Image editors typically have authority to create a histogram of the image being edited. The histogram plots the number of pixels in the image with a particular brightness value. Algorithms in the digital editor provide facility to the user to visually alter the brightness value of each pixel and to dynamically display the results as

alterations are made. Improvement in picture brightness and contrast can thus be gained.

F.NORMALIZATION

Normallization is a procedure that modifies the range of pixel intensity values.The distribution of colour values in an image is dependent on the illlumination which may vary depending on different lightning codition or different cameras.colour normalization is used in object recognization technique based on colour, to recompense for these variation.
After normalization the object is compared with histogram which is stored in java serialization database. If the match is found then by using text to speech conversion technique sound will be generated and it will be heard by blind person.

V. METHODOLOGY

1.Preprocessing

Background image has to be captured after installing camera at its place and care must be taken that camera shouldn't move once background is captured. Subtraction between background image and current image obtained from camera is used to detect intrusion. If there is no intrusion then previously captured background image and image taken from camera at any later time will have no difference and result of subtraction will be zero (a complete black image). But if some object has intruded in the scene then difference between those two images will be the object itself and is not

zero, as in previous case. This subtraction process is shown in Fig.3.Result of subtraction is not suitable for feature extraction as outer edges of intruding object are not clearly visible. This problem can be depicted from Fig.6.

2. Feature extraction:

The term shape is commonly used to refer to the geometric properties of an object or its external boundary (outline, external surface), as opposed to other properties such as color, texture, material composition. There are several ways to compare the shape of two objects:Shape description: Shape of an object is nothing but distances of all the points on its boundary from some reference point. This reference point can be centroid (center of mass) of an object Centroid of object does not change though object is rotated.
Center of circle is its centroid and distances of all points from centroid are equal. For square it will be different case. Similarly if we measure distances of some points on the boundary of an object as shown in Fig6.h then we can get shape descriptors. In our case we have considered those points on the boundary of the object which are separated by angle of 10 degrees. All the angles are measured from

centroid of the object. Thus we have calculated 36 distances corresponding to 36different angles separated by 10 degrees. This angle separation can be reduced in order to increase accuracy. But along with reduction in angle separation, number of readings will increase and it will increase computation time. So there is tread off between ability of system to work in real time and its accuracy. Normalization of the data obtained above is done in order to enable scale invariance. Object viewed from various distances will not differ in their shape. But they will differ their in sizes. Normalization will enable comparison between objects those are present at various distances from camera.

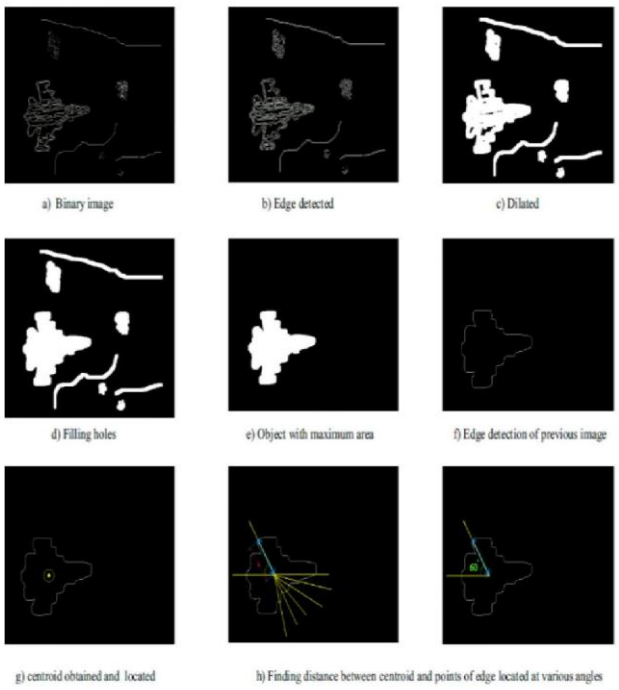

FIg.6 Feature extraction

VI. CONCLUSION

In this we studied technique of object recognition. The technique briefly discussed and example is given for proper understanding of the technique. The corner detection method serves to give a good approximation for a number of objects but the constraint being that it can recognize objects by matching only if the number of corners detected in the test image and that of present in the reference image are same.

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