Image Identification in Android Applications aiding visually impaired users.

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Abstract – Here in this paper, Here in this paper, we have listed the important functions of this android system that are used for blind users. Main function is used to recognize scanned objects. Two other functions are used to identify colors and the source of light. The paper concludes with a brief review and the test case results of the system modules

Keywords: Visually Impaired users, android system, object identification..

I. INTRODUCTION

Visually impaired users cannot use technology efficiently due to their disability, nor can technology help them to overcome problems caused due to their disability, until now.

To make daily activities easy for users, we have designed this system. It is a system based on serial databases presented as an android application.

When user scans an image, it is matched with images stored in the database and it returns the name of the object in the form of a voice message.

II. SYSTEM MODEL

In this The problem with many of applications is that they are very expensive technologies not available to our everyday Jane and John.

Or they need huge amount of time pertaining to their maintenance and keeping the technologies up-to-date.

Both these problems lead to a large number of visually impaired from being deprived of such technological advancements.

Nowadays, mobile phones, especially Smartphone are very widely used even among the visually impaired people. Smartphone enable visually impaired users to connect, communicate and socialize even without feeling the need of vision. Phones with a physical keyboard have become uncommon. This trend had initially caused a challenge in the usability for the blind as they faced difficulties in handling small touch-screen devices. But with comprehensive user interface technologies in the android Smartphone, they can get a great deal of tasks done through their phones. They now use their phones as a tool in various tasks which is also equipped with integrated internet services.

Therefore, currently, android based technology in phones is the most popular among visually impaired and blind people.

For our module of image processing application we have decided to choose the Android, because of its tremendous popularity among our users.

Moreover it is equipped with speech synthesis and accessibility software.

Besides, The Android system is well adapted to the requirements of the blind. Smart phone have many prerequisite unit features which are an advantage: they come with good quality cameras, GPS system, audio file managers etc. and these features in the android phones can be used in an application such as ours dedicated to the blind. When using other blind-aiding applications, the user has to go through the inconvenience of depending on more than one device for assistance.

This is the exact problem which is addressed and solved in this paper. This system is based on a memory based database where the scanned object images are stored while in the training mode. Thus while using the app, the user takes an image of the object it's matched with images in the database and the result is the identity of the object conveyed to the user by means of a pre-recorded voice message

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III. PREVIOUS WORK

Various application focused on the same cause are available in the market already. They are used mostly for limited purpose or activity and do not offer an overall assistance to the visually impaired users.

1) Some applications scan barcodes of objects and recognize them so as to help users choose their purchases during shopping.

2) Some applications have a voice assistance which narrates instructions to users about how to use their phone effectively.

3) Some have a GPS function which assists in the form of a voice - directions to reach the destination selected by the user.

4) LookTel has designed similar software to identify objects present in the focus area of the camera of the application. The photos of the daily used objects are stored in memory [9].

5) EyeRing project is another application which acts as a virtual walking stick, has functions like calculate distance for the user etc [10].

All these applications are very expensive and hence it is difficult to reach an ordinary middle-class man. As a result, they become deprived of any assistance. We have solved this problem in our system..

IV. PROPOSED METHODOLOGY

In this In the developed software tool for Android Smartphone we propose the three following image processing modules:

1. A colour detection module,

2. An object recognition module and a

3. Light source detector.

1. The color detection module

The input to the color detection algorithm is the image captured by the built-in camera of the smartphone. The minimum resolution possible which is used for this algorithm is (320x480 pixels)[2]. The first image extracted from the camera is in the RGB format which is converted into the HSI (Hue Saturation Intensity) color images by the algorithm. HSV is a color model that describes colours (hue or tint) in terms of their shade and their brightness.

. This is very useful in many applications. When histogram generation of a color image is done, only the intensity value is taken into account. In this algorithm, separation of color components from intensity is important.

In the HSI color space, an average variable of the given colour i.e. the H component is calculated for the image. This average color is compared with a predetermined reference table of colours and with respect to this table, the color of the photographed object is determined [3]. If the image appears to be too dark or too bright after processing, it is discarded and a specific, pre-recorded warning message is generated.

Fig: 2.1Colour Identity in the application

Steps / Algorithm used are as follows:

1. Traverse through entire input image array, traverse through entire Image

2. Read individual pixel color value (24-bit).

3. Split the obtained color value into separate R, G and B 8-bit values.

4. Calculate the grayscale component (8-bit)

For given R, G and B pixels using a formula which gives the average value of all three components.

5. Compose a 24-bit pixel value from 8-bit grayscale value.

6. Store the new value at same location in output

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And re-Compose 24-bit Value & Save To output Image

This algorithm was tested taking into consideration various test scenarios:

1. With the camera flash switched on : the colours in the given image were processed and identified by the algorithm for all lighting.

2. With the camera flash switched off: the algorithm resulted in identifying predetermined colors in good lighting conditions

3. With the camera flash off and poor lighting conditions: the algorithm failed to identify many colors.

B. The Edge Detection module

The main objective of this system is to recognize objects from images captured or scanned by the built-in camera of the phone.. The algorithm should be unaffected by parameters of the image such as the scale, angle of rotation, the direction and intensity of the light source etc.

Before the image recognition algorithm proceeds, there is an algorithm used for edge detection. One of the commonly used methods is Gaussian blur method. Gaussian smoothing is commonly used with edge detection of objects especially in the field of image processing.. Most edge-detection algorithms are sensitive to noise. Using a Gaussian Blur filter before edge detection helps to decrease the noise in the image, which gives better result of the algorithm.

The Gaussian blur is a type of algorithm that uses Gaussian function for computing the changes to apply to each pixel in the image.

Prerequisites of the edge detection algorithm:

An efficient edge detector needs to satisfy

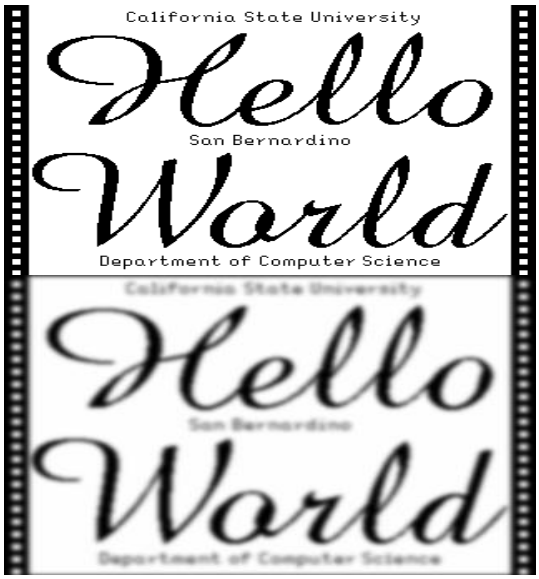
these three conditions:

1. The algorithm should respond only to edges,

and should find each edge; no edges should be left out.

2. The distance between the edge pixels as found by the detector algorithm and the actual edge should be minimum.

3. The edge detector should not identify multiple edge pixels where only a single edge exits.



Steps in edge detection algorithm :

Edge detection algorithms is carried out in three or four steps:

1. Filtering: elimination of noise in the image

2. Enhancement: amplify the difference between edges and non-edges

3. Detection: use a threshold computation function

4. Localization: estimate the geometry of edges beyond pixels in the image.

3. Image recognition algorithm

In, image processing is where the input is an image captured by the camera and the output of image processing is a set of Characteristics or parameters related to the Image. In this case, it is the name of the object in the image in the form of a voice message [4].For image processing, to improve the contrast of imagery, it is desirable to use the entire brightness range of the display medium.

This is known as image enhancement.

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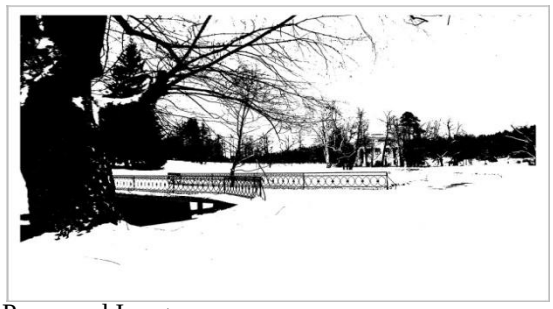
An image processing operation defines a new image in terms of an existing image .The simplest operations transform each pixel in isolation.

Some operations restore the intensity of the image, but mobilize the pixels around in the input image before processing through the image.

Original image



Processed Image

- Noise

Image processing is also uses noise reduction.

Common types of noise:

1. Salt and pepper noise: contains random

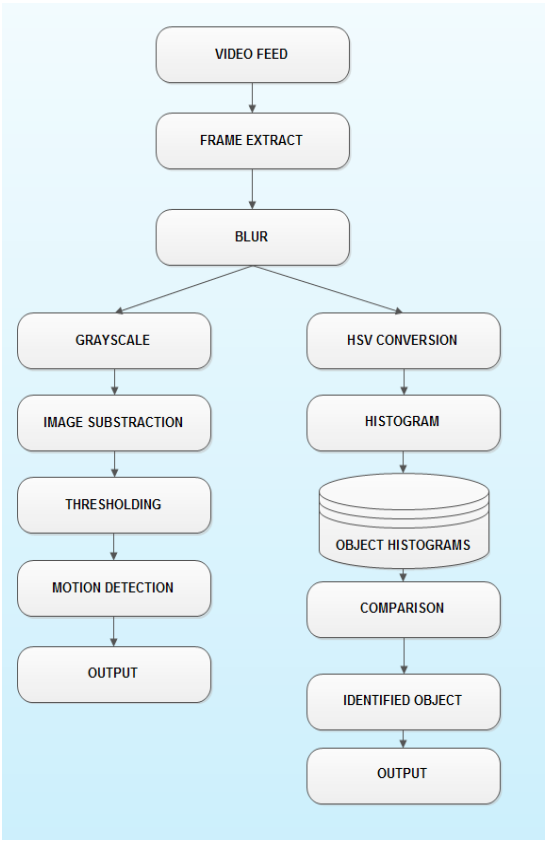
occurrences of black and white pixels in the image

2. Impulse noise: contains random occurrences of

Only white pixels

3. Gaussian noise: variations in intensity which are drawn from a Gaussian normal distribution.

Following is the block diagram representing the main modules and their flowchart in the object recognition algorithm



V. SIMULATION/EXPERIMENTAL RESULTS

This application is designed in Java in Android OS using the tool-Eclipse IDE.Parameters of testing are: performance of the system and accuracy of the result. While testing, we used around 25 daily usable objects and took photos of them.

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These photos were taken in the daylight. And we have used a high-end smartphone for this purpose.

S. No.	Module parameters	Colour detection		Image Processing	
		f_1	f_2	f_1	f_2
1.	Accurate Identification	83.2 %	94.73 %	73.12 %	84.8 %
2.	Inaccurate Identification	12.2 %	5.6%	18.7 %	13.4 %
3.	No Identification	1.8%	1.9%	1.2%	1.5%
4.	Average Processing time (in Seconds)	6s	8s	5.1s	6s

TABLE 1. PARAMETER TESTING MODE

CONCLUSION

In this In this paper, we have suggested the functions used for image identification application used for visually impaired users. The system contains color detection, edge recognition and image processing functions. The results of this system depend upon the quality of image and lighting conditions.

VI. FUTURE SCOPES

The system can give better results if more efficient database technology is used. Also other algorithms can be used to decrease run-time and get results faster author will explain the future of his/her research.

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