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Object Detection, Location Finder for Blind People Using Android Application

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Abstract: There are purblind people who face many problems in their day to day life even in today's developed technical world. So to provide them help by a smart way we are developing an android application. By providing such smart way platform, we can provide access of visual information to blind people. Blind people faces so many difficulties during collecting the information (of a object/thing they are taking picture of) which is necessary to them but required for this application to work because they are unable to see that picture. In this, we present detection of objects by providing ORB (Oriented FAST and Rotated BRIEF) algorithm, which requires high quality photos to support recognition task. The recognition process begins by matching individual features of the query image with trained image. There are different algorithms for object recognition such as SIFT (Scale Invariant Feature Transform) & SURF (Speeded Up Robust Features) but ORB is very fast algorithm as compared to others. To provide information of users, based on their location is a growing field.GPS provides location for mobile network. In this paper we are providing these two technologies under one application.
Index Terms: SIFT; SURF; ORB; Key-points; FAST; BRIEF; GPS;

1. INTRODUCTION:

The blind and the visually impaired faces diverse kinds of life challenges that normally sighted people take for granted. Computer vision and human-powered services can provide access to blind people for visual information in the world around them. We are offering a significant help through this application for smartphone which are equipped with speech synthesizers [3]. Android application is widely used throughout the world and affordable by normal people. Today's Tech-Era is so vast, which is able to provide different applications especially for blind people. Blind people are dependent on other people so to reduce their dependency we have taken advantage of these things and decided to build the new application which will detect the object for them. In this we are using Open-CV library which is going to provide different algorithms related to image recognition and detection [2]. Under these concepts we are developing application which is used for detecting object from runtime video and providing output as its name or direction to audio format.

1.1 Why Android?

Mobile phones have become a very common platform for communication and personal use. Android is a development platform for the application and it is becoming the most widely used platform among the mobile technologies. (According to Google 2013 research, there are more than 1 million android application published and over 50 billion applications downloaded. A developer survey conducted in April-May 2013 found that 71% of mobile developers develop for android. At Google I/O 2014, the company revealed that there were over 1 billion active monthly android users, of from 538 million in June 2013 [9]. As of 2015, Android has the largest installed base of all general purpose operating system.

2. EXISTING SYSTEM:

This object recognition system consists of two key modules: feature extraction and object recognition. Feature detectors such as Scale Invariant Feature Transform (SIFT) and Speed Up Robust Feature (SURF) are good methods which yield high quality features, however they are too computationally intensive for use in real-time applications of any complexity[5]. Compared to PC platforms, smart phone platforms have limited resources, so computation-intensive SIFT and SURF descriptors are less usable in such resource-limited environments.

2.1 SIFT:

SIFT has the rotational invariance, scale invariance, brightness invariance and good anti-noise ability [4]. SIFT algorithm makes the use of collection of local features which are known as key-points [7]. These key-points are invariant to scaling and rotation effect and help to detect the target object in an image which contains many objects. Advantage of this algorithm is that it provides the maximum accuracy of the object matching but drawback of this algorithm is it is slowest algorithm which takes

maximum processing times as does the lots of calculation [7].

2.2 SURF:

SURF is the advanced version of SIFT. The surf uses the silent features which are extracted from the integral images in the image and the box filter. Instead of extracting the more local features the silent feature are used for computational and hence the computational efficiency is enhanced in these algorithm [7]. The advantage of the SURF algorithm is that it performs good with blurring and rotation image but it is poor for handling the images with viewpoint change [8]. SURF algorithm is based on the Hessian matrix. The feature matching is done with nearest neighbour and Euclidian distance.

3. PROPOSED SYSTEM:

3.1 ORB:

ORB is a very fast algorithm as compared to other SIFTS and SURF algorithm [1]. ORB uses the known FAST key-point detector and the BRIFE descriptor, that why we call it as ORB (Oriented FAST and Rotated BRIEF). It is combination of FAST detector and BRIEF descriptor [7]. Both these techniques are attractive because of their performance and low cost.ORB is rotation invariant and resistant to noise. Advantage of ORB is its very low memory requirement [1].

3.2 ***Comparison between SURF, SIFT and ORB:***

Sr.no	SURF	SIFT	ORB
1.	Less speed(Performance)[10]	Less speed(Performance)	Fast speed(Performance)
2.	More Mathematical[7]	More Mathematical[7]	Less Mathematical[7]
3.	Calculation (Gaussian Matrix)[10]	Calculation(Hessian Matrix)[10]	Calculation(Hamming Distance)[6]
4.	More noise affect[6]	More noise affect[6]	Less noise affect[6]
5.	Large code of algorithm[1]	Large code of algorithm[1]	Optimum code of algorithm[1]
6.	Time complexity is more	Time complexity is more	Time complexity is less
7.	Less efficient(Filtering)[7]	Less efficient(Filtering)[7]	More efficient(Filtering)[7]

4. SYSTEM ARCHITECTURE:

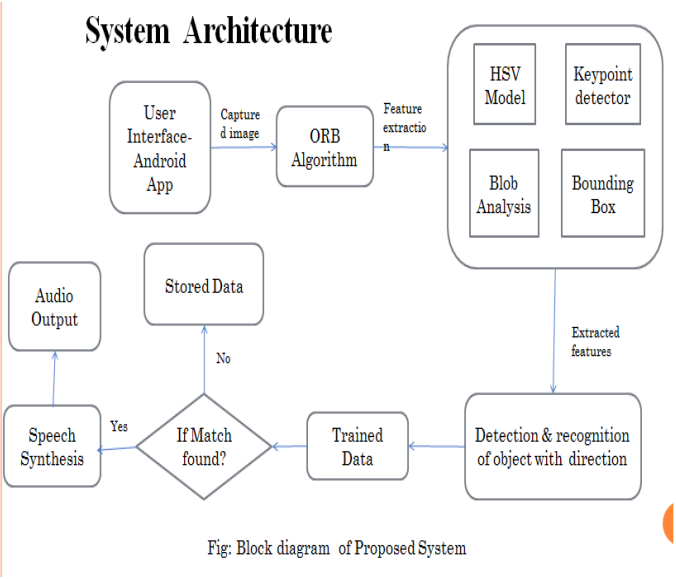


Fig: Block diagram of Proposed System

- ***User Interfaces*:** Android App
- ***Dataset training:*** Dataset training, loads the sample dataset images.
- ***Blob Analysis****:* Blob Analysis is a fundamental technique of machine vision based on analysis of consistent image regions. As such it is a tool of choice for applications in which the objects being inspected are clearly discernible from the background. Blob detection refers to mathematical methods that are aimed at detecting regions in a digital image that differ in the properties such as brightness or color compared to areas surrounding those regions.

- ***HSV Model****:* HSL stands for hue, saturation, and lightness, and is often also called HLS. HSV stands for h0ue, saturation, and value, and is also often called HSB (B for brightness). A third model, common in computer vision applications, is HSI, for hue, saturation, and intensity.

- ***Bounding Box****:* In digital image processing, the bounding box is merely the coordinates of the rectangular border that fully encloses a digital image when it is placed over a page, a canvas, a screen or other similar bi-dimensional background.

- ***Detection and recognition of object with direction****:* This module detects and recognizes the object.
- ***Speech synthesis****:* The process of generating spoken language by machine on the basis of written input. Speech Synthesis can be described as the artificial productivity of speech of human being. For this purpose we

use a machine/computer which is called as speech synthesizer [3] and this can be implemented in software or hardware products. A text-to-speech (TTS) system/machine is responsible for converting normal language text into speech format while other system provides symbolic linguistic representations like as phonetic transcriptions into speech.

5. LOCATION DETECTION:

Location based service (LBS) can be explained as the services which uses the users geographical location which consist of X and Y co-ordinates, which is generated by GPS (Global Positioning System) which acts as positioning device[6]. Application works in open space areas only. Since it depends on GPS by computing the Latitude and Longitude values of mobile.

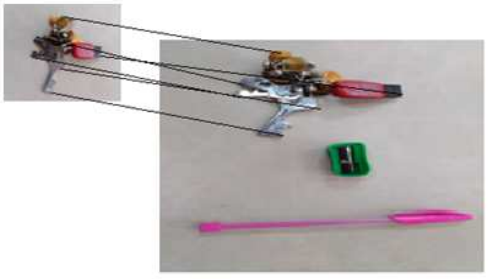
6. FLOW OF PROPOSED SYSTEM:

Proposed work can be divided into two main parts first one the simulation flow and second one is its implementation.

1. We will take the two input images out of which first is trained image and another is query image.
2. Then extract the features of both the images by using FAST key-point detector and BRIEF descriptor.
3. Match those features with each others.
4. If maximum matches found then image will get detect.
5. Repeat same process for next object.

7. RESULT:

a) Trained images b) Query images



c) Object Detection

Fig - Object Detection using ORB

7. DISCUSSION

The proposed object detection with location finding system is built for all mobile phone but we are currently working on Lenovo (Lollipop 4.4.4).

The proposed system is developed in a PC environment (Microsoft Windows 8 OS, Intel-i3 4030U 1.90GHz, 4GB RAM) using the Android's Software Development Kit (SDK) version-4.0.3 Ice-cream-Sandwich, Android Studio 1.5, JDK 1.7 and Sqllite.

While installing this application on a smart phone it is compulsory to install OPENCV Manager on it. We have done experiment with 6 objects. Out of which it was correctly identifying 5 objects.

8. CONCLUSION

This paper describes object detection which is achieved by using JAVA language and implemented on android device by using ORB algorithm which also consist GPS system for identifying user's location also object's distance from user can be provided by using scaling.

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