

Mobile Assisted Product Recognition using Barcode for Visually Challenged

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ABSTRACT

In supermarket the visually challenged people will face many problems to know the product cost, quantity, manufacture date and expire date without assistance from shopkeeper. This paper deals with a mobile application which is developed for visually challenged people and to make them independent in the society. This application is developed by using android studio. This system is implemented to create an application that scans the barcode image of a product and extracts the barcode number from the captured barcode image. The extracted barcode number is matched with the database available in the supermarket. Multiple application programming interface (API) is in the form of some libraries to interface to a particular programming language.

Index Terms: Barcode, camera, visually challenged people, mobile application

INTRODUCTION

Over 285 million people are visually impaired in worldwide, of whom 39 million are blind and 246 million have moderate to extreme visual impairment. It is estimated that without extra interventions, these numbers will raise to 75 million totally blind and 200 million visually impaired by the year 2020. 82% of people living with blindness are aged 50 and above. This number is increasing quickly as the baby boomer generation goes recent developments in computer vision, digital cameras and portable computers make to feasible to assist these individuals by developing camera based products, according to the National Eye Institute (NEI), in 2010 U.S. has 66% prevalent cases of blindness in female and 34% in male. The World Health Organization (WHO) also recognize at 180 million people that are affected by the visual deficiencies, among which 40 to 45 million are fully blind. [1]- [4]

The average numbers of blind people, with low vision and visually impaired per million populations in different countries are discussed in figure.1. As visually challenged people to be independent in the society we take the help of the Smartphone technology in this paper.

Smartphone's have proven their importance among visually challenged users, which supported to concentrate on Smartphone applications which are especially designed for visually challenged people. Common-purpose Smartphone's applications take initiative to take the place of special-purpose devices, but visually challenged peoples pick different devices like light detector, barcode readers, and color identifiers. Some accessible applications which use camera of existing phones involve color identifier and currency-reading applications. The inbuilt motion sensors in the smart phones have been used for videos stabilization. This research is conducted on, to make Smartphone applications easily accessible and usable for visually challenged people. Relative analysis is performed on the based upon the survey conducted on the visually challenged people. The main aim of this paper is to emphasize usability and accessibility issues in

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Number of people (in thousands) blind, with low vision and visually impaired per million populations

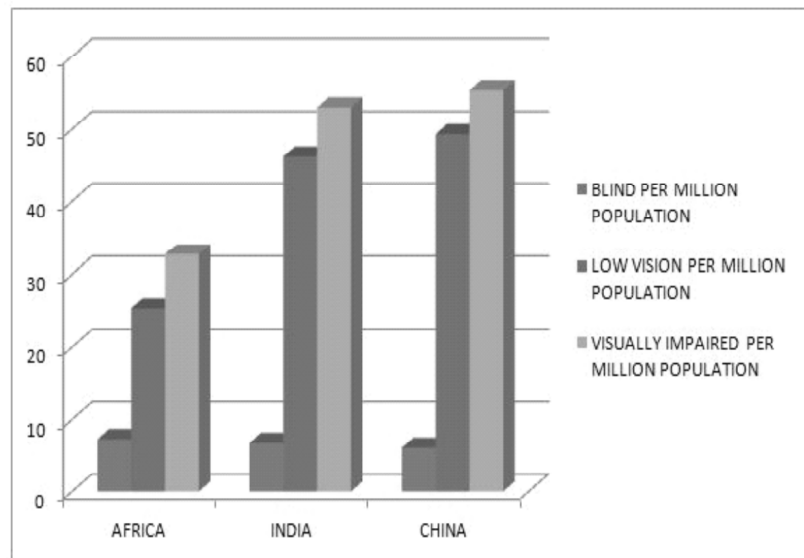


Figure 1: Number of people blind, with low vision and visually impaired per million populations. [2]

Smartphone's applications and propose a new design to enhance their easy usable and accessible for visually challenged people. [5][6] Generally in super market scenario the visually challenged people can access mobile phone to get the product details by scanning the barcode of the particular product. In India on an average there are mostly small supermarkets. They consist of 1000 product stock on overall average in most of the supermarkets. The total product details are stored in the databases which are most common in the different supermarket.

A barcode is an optical machine-readable representation of the data which is relating to the object to which it is attached. Originally barcodes systematically represented data by altering widths and spacing of parallel lines, and which may be referred to as linear or one-dimensional (1D). Later two-dimensional (2D) codes are developed, using rectangles, dots, hexagons and other geometric patterns in two dimensions, usually called as barcodes although they do not use bar strips as such. Barcodes originally were scanned by special scanners called barcode readers. Future applications software became obtainable, for devices that could read images, such as smartphones with cameras.



Figure 2: Sample barcode image courtesy [7]

The Universal Product Code (UPC) is a barcode symbolical presentation (i.e., a specific type barcode) that is mostly used in the United States, the United Kingdom, Canada, and in other countries for trace trade items in super markets and stores. The most common formation, UPC-A, consists of 12 numerical digits, which are especially assigned to each trade item. UPC data structures are an element of GTINs (Global

Trade Item Numbers). All these data structures follow the global GS1 specification which is based upon international standards. [8]

PROPOSED SYSTEM

This paper presents mobile assisted product recognition using barcode. As the system design consists of different components: barcode scanning, extracting barcode number, audio output. Now a day's smart mobile became a part in every one's life. Mobile is easy for visually challenged people for accessing in super market. This paper we designed an application for visually challenged people to get the product details as audio output by scanning barcode. A tactile ID is given in Braille format near to the barcode, to find the barcode in whole product by visually challenged people. The mobile camera captures the barcode image. Barcode number will be extracted from the captured image and search the product details in the data base with the extracted barcode number. If the Product is stored in data base it gives product details as audio output or else, it gives the audio as "get the assistance from the shop keeper". This process programming is written in core java.

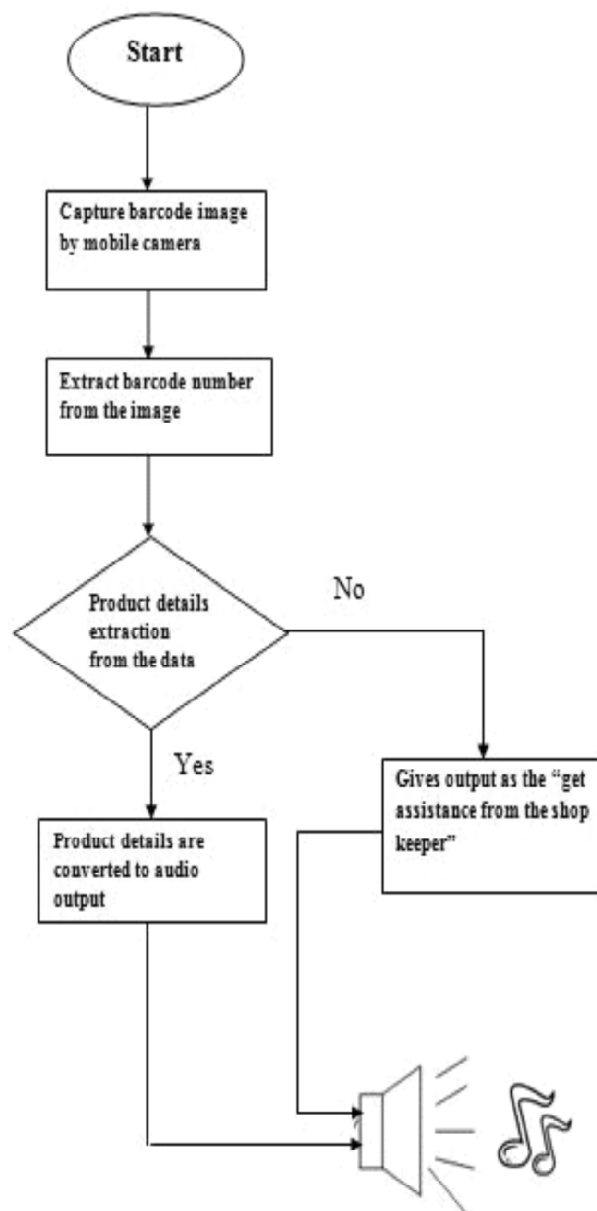


Figure 3: Flow chart of proposed system to recognize the product details by visually challenged people through mobile

(a) Barcode capture: Mobile camera is used for capturing the barcode. The resolution of the camera is 1080*1920 pixels. A user captures the image of a barcode object, and the underlying platform detects a marker, which triggers it to add a virtual object to the top of the real-world image and displays on camera screen.

(b) Extraction of barcode number: To extract the barcode number, the technology uses a small video camera to take an instant digital photograph of the barcode. And then analysis the photograph, selecting only the barcode part of it and converting the pattern of black and white bars into a number. The process in detail is:

1. Scanning head shines LED onto barcode.
2. Light reflects back barcode into a light detecting electronic component called as photoelectric cell. White areas of the barcode reflect back the most of light~ Black areas reflect less.
3. As the scanner moves past the barcode, the cells produce a scale of on and off pulses that related to the black and white stripes. So for the code shown here (“black black white black black white white”), possibly as”off off on off off on on.”
4. An electronic circuit attached to the scanner translates these on and off pulses into binary digits (zeros and ones).
5. The binary digits are fed to a computer attached to the scanner, which recognize the code as 11101011.

(c) Audio database: There are some product details as an example, stored in data base. To store these details, we take help of mySQL software.

Table 1
Product details in data base, MFD-manufacture date, Exp- expire date

<i>Product ID</i>	<i>Product name</i>	<i>cost</i>	<i>Net wt</i>	<i>MFD</i>	<i>Exp date</i>
9789167156171	India gate	₹ 500/-	2 kg	24th march 2016	7th Aug 2017
7123456789015	Cashew nuts	₹ 1,085/-	1 kg	2nd May 2015	25th Dec 2020
5060028300376	Hamam soap	₹ 15/-	50 gm	2nd April 2015	25th Oct 2017
8904059800029	Bril pen ink	₹ 18/-	50 ml	April 2014	Sep 2016
8901233018720	Cadbury dairy milk	₹ 15/-	38 gm	Nov 2015	Nov 2016

(d) Text to speech conversion: In core java there are special libraries called as “speech.tts.TextToSpeech” for conversion of text format to speech. After extracting the barcode number, it connects to the PHP server which is database for application and gives that particular product details in audio output. The language used for creating application is core JAVA. Android studio is the software which supports to create an efficient application. In this software there are two sessions as layout and activity main. In layout session we design an application screen layout. In activity main we write the code to run the system design process. If we run this core JAVA coding in android studio it creates APK (application packaging kit) file which is to be install in the mobile. To create the database, we use mySQL software.

Java is an object oriented programming language. Its architecture provides a portable, robust, high performing environment to the development. Java gives easily carried by compiling the byte codes for the Java Virtual Machine, which is then interpreted on each platform by run-time environment. When you compile the code, the Java compiler creates machine code called as byte code for theoretical machine called Java Virtual Machine (JVM).

The JVM is suppose to be executed the byte code. The JVM is generated for the controlling the issue of probability. The code is written and compiled for one of the machine and interpreted on the entire machines. This machine is called Java Virtual Machine. [9][10]

RESULTS & DISCUSSION

The results obtained from implementing the flow chart in mobile application. The results consist of extracted barcode number and product details in audio. The tested image gives the barcode number and the product details displays on screen as well as the audio output.

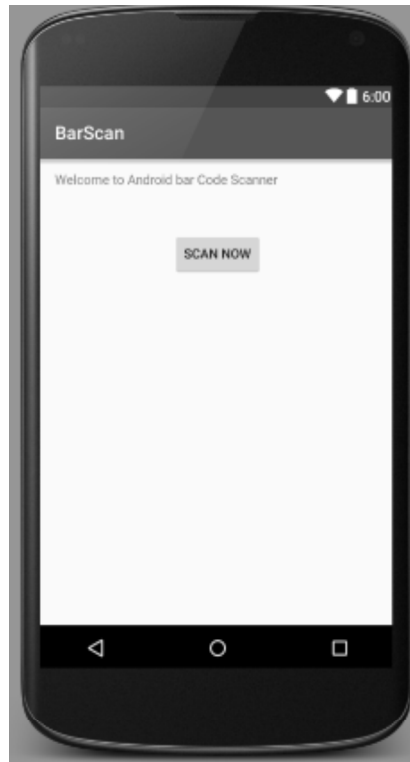


Figure 4: Mobile application screen

The above figure represents the screen of the developed application. The scan button covers the full screen so that blind people can touch anywhere on the screen.



Figure 5: Scanning barcode of a product in supermarket environment

The figure shows scanning the product in supermarket with the developed application.



Figure 6: Extracted product details displays on screen as well voice output is provided

After scanning the product, the barcode number match with the data base and gives the product details in voice output as well as displays product details on screen.

CONCLUSION AND FUTURE WORK

In order to solve the problems for visually challenged people facing in supermarket to make them independent to purchase products. In this paper we discussed about mobile application to recognize product details by using barcode for visually challenged people. It is simple to use and it is available in free of cost for visually challenged people. It scans the barcode in short period of time and gives quick results. Further we can extend this application as the people give speech message to operate this application. The application will work automatically by receiving the speech message and gives the required output in audio. This will be more useful to the visually challenged people.

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