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Review on the Barcode Technology of Android Application Development for GST Products Database System

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***Abstract**: Starting from 1 April 2015, the Goods and Service Tax will be introduced by the Malaysia Government to be implemented in the country. Since there is no such application provided in the market that can help the struggling citizen to recognize the GST goods, hence; this study will compare the existing Goods and Service Tax system and expose the user an idea to know the items with GST. Selected review papers had been chosen as the man reference to review this specific issue that related to Goods and Service Tax. Advantages and disadvantages of the review paper will be tabulated as to compare and to be used in order to produce a user friendly Android application in the future. In conclusion, the grayscale technique was the suitable and convenient to be used in the image processing. Since, the accuracy of the technique is quite high and from all proposed techniques it is the easy one. The emphasis of the 1D barcodes is about the identification, since the scanning of the barcodes (from the android program) going to be connected to the database; this technique will be make the application to be simple and suitable for all type of user.*

***Keywords:** 1D Barcode, Android, Barcode, Database, Goods and Service Tax.*

1. INTRODUCTION

Good and Service Taxes (GST) is not the new thing in the developed countries. The GST was invented by a French tax official in the 1950s and also known as Value-Added Tax (VAT). More than 160 countries in the world have practice the effectiveness on GST and VAT in their country including China, Singapore, Thailand and others. The benefits of GST are to improve standard of living by the revenue from GST could be used for the development of social infrastructure such as health facilities and education institutions. Besides that, it also could increase the global competitiveness since the product of Malaysian exports will become more highly regarded in the global stage. GST also could enhance compliance because the current SST might have few weaknesses and GST system could solve the problems in terms of tax administration. With GST, more businesses can receive benefit from recovering input tax, as to avoid the multiple taxes and higher levels of tax-on-tax (cascading tax) [5]. Since, this the first time Malaysia implementing the GST, Malaysian is still not familiar with the situation. Citizen also could have some problem to recognize and memorize all the products with the GST charge. Besides that, there is still no application that helps citizen to recognize all GST products yet in the market. Even though, there is a ministry will provide the list of GST items in the early in 2015, still the citizen could not remember all the 944 the items in short time [1]. In addition, problem may occur if the application only provides the list of the product without the scanner, since the items is in the big amount. There are three main objectives for this paper. In order to find the most suitable technique to be used in building an application, these review objectives must be fulfilled. The review objectives are to identify the barcodes reading techniques currently been used or in the market, summarize the comparison between each design by listing down its advantages and disadvantages. Finally this paper will analyze and conclude the most suitable design and technique to be used for designing the user friendly GST products database system.

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Year	Country	Rate
1980	China	17.0%
1985	Indonesia	10.0%
1985	New Zealand	12.5%
1991	Thailand	7.0%
1994	Singapore	5.0%
1994	United Kingdom	17.5%
1996	Philippines	10.0%
2000	Australia	10.0%
2005	India	12.5%

Figure 1: GST and VAT rate from the other countries.

2. LITERATURE REVIEW

2.1. Automatic Location for Multi-Symbology and Multiple 1D and 2D Barcodes.

This paper proposed a general localization framework for extraction of real barcodes under a complex background when multiple symbology types exits in the same snapshot for 1D barcodes, 2D barcodes or both.

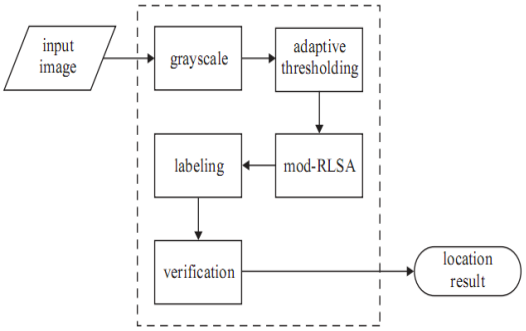

Figure 2: Flowchart of the proposed barcode location framework

This equation below was applied to generate a grayscale image G, which is used as a measure of overall brightness or luminance. R, g and b individually represent red, green and blue channel in an image. The grayscale technique has been proposed by Daw-Tung Lin and Chin-Lin Lin.

G(x,y)= 0.299 x r(x,y) + 0.587 x g(x,y) + 0.114 x b(x,y) ….(1)

There are other techniques are listed including adaptive thresholding, application of modified run length smearing algorithm, connected-component labeling and barcode verification. After the proposed technique was implemented, several of 1D barcodes and 2D barcodes in mixture form were experimented. Experimental result as shown in the figure below [3].

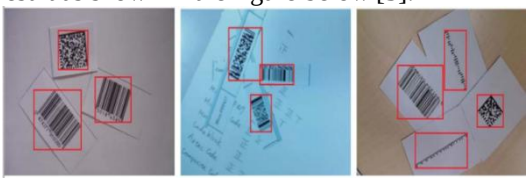

Figure 3: Barcode location result

2.2 Reading 1D Barcodes with Mobile Phones Using Deformable Templates.

Barcodes reading need a strong accuracy to surrounding conditions like blur, noise, low resolution, or low quality camera lenses. The proposed approach is relied on deformable templates and exploits all of the gray-level information of each pixel due to the parameterization of the templates. An image containing a barcode, two distinct operations are needed for accessing the information contained in the barcodes: localization and decoding. Localization algorithm assumes that the image of the barcode is captured with camera oriented so that its vertical axis is approximately parallel to the bars. While decoding algorithm analyzes a single scan line extracted from the detected barcode area.

According to Orazio Gallo and Roberto Manduchi, the localization algorithm assumes the barcode image captured is vertical. The image captured has to compute the horizontal and vertical derivatives, II(n) and Iy(n), at each pixel n and combine them together in a nonlinear fashion as by:

Ie(n)= |II(n)|-|Iy(n)|v (2)

In case of decoding, based on the previous detected end point of scanline, the spatial location is computed for each digit segment in the barcode [4].

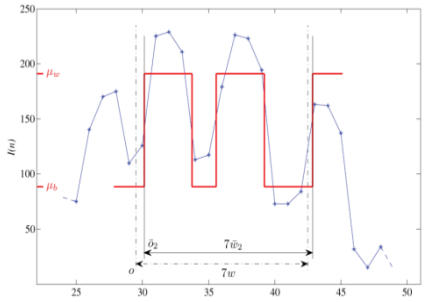

Figure 4: A sample of the intensity profile in a scan line (blue line)

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2.3 A Review on 1D & 2D Barcode with QR Code Basic Structure and Characteristics.

Due to the high speed in decoding, the QR code is widely used in commercial application since it could store high capacity information. Barcodes use the different width between each line to another. For 1D barcodes, the lists of codes are as follows, code 39, code 128, EAN-13, EAN-128, ISBN and so on [6].

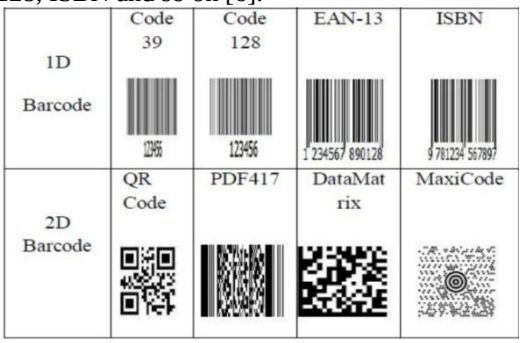

Figure 5: 1D and 2D barcodes

2.4 A Bayesian Algorithm for Reading 1D Barcodes

There are several research on about this algorithm for reading 1D barcodes, including waveform analysis, scan line date(by a laser scanner) and other signal / image processing techniques to detect edges. In Bayesian Model, all knowledge of barcode technology was combines [7-8]. These are including geometric distortion, checksum and few others. From the figure 6, the barcode pattern consists of a group of black and white bars with difference gaps between the bars [9-20]. There are 29 white and 30 black bars, giving a total of N=60 edges. From left to right polarity of edge i (where i= 1… N) is (-1)i. Each bar has one of four possible widths:1 , 2 , 3 or 4 , where is the modulus or fundamental width of the barcodes[21-34].

Figure 6: UPC-A barcode, encoding 12 digits

In the checksum part, the digits of barcodes are obeyed to the equation below.

$$[3\sum_{i\ odd} d\ i + \sum_{i\ even} d\ i] mod\ 10 = 0 \quad ...(3)$$

$$\begin{cases} 3di & mode\ 10 & if\ i = 1 \\ (3di + ci - 1) & mode\ 10 & if\ i = is\ odd \\ (di + ci - 1) & mode\ 10 & if\ i = is\ even \end{cases} \quad (4)$$

This mechanism allows for verification of the barcodes by the reader [9-34.

3. COMPARISON

From the review paper, few methods for image or signal processing that suitable for new Android Development for GST Products that connect to Database Systems collected. Below are the list and the few advantages and few precautions from the technique.

Table 1 Comparison of the review paper

Papers	Advantages	Disadvantages
Automatic Location for Multi-Symbology and Multiple 1D and 2D Barcodes.	Include adaptive thresholding, application of modified run length smearing algorithm, connected-component labeling and barcode verification	Cannot handle of real barcodes under complex background when 1D and 2D exits in one snapshot.
Reading 1D Barcodes with Mobile Phones Using Deformable Templates.	Relies on deformable templates and exploits all of the gray-level information of each pixel due to the parameterization of the templates	Effect could occur the reading of barcodes from blur and low resolution.
A Review on 1D & 2D Barcode with QR Code Basic Structure and Characteristics.	Emphasis on the identification of the products. Easy to read by scanning the lines and the spaces.	Limited size of storing (1D). Less safety (1D) compared to 2D

4. CONCLUSIONS AND FUTURE WORK

In this paper, there are several types of image processing to recognize the barcodes. For this

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project the most suitable is the grayscale technique because the convenient of processing. Since, the accuracy of the technique is quite high and from all proposed techniques it is the easy one. The emphasis of the 1D barcodes is about the identification, since the scanning of the barcodes (from the android program) going to be connected to the database; this technique is simple and suitable.

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