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IMPROVING THE PROCESSING SYSTEM OF ACCESSING ELECTRONIC BOOKS INFORMATION BY USING QR CODE TECHNOLOGY

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Abstract:
The modern technologies and applications compatible working with various operating systems increase the accuracy of completion and quick access, and as a result of the increasing reliance on Wi-Fi networks and the use of mobile phones and their applications and the spread of e-learning with the tendency to e-books on a large scale, This paper focused on developing a system that generates a unique QR code containing information and an identifier number for each electronic book within E-library system based on a customized database. The system will automatically generate a unique QR code for each book, that includes brief information about the book and its ID number, this QR code can be scanned by any scanner application and identify the book's information quickly and easily, noting that the QR scanning process can be done without the need for the mobile device (scanner by camera) to be connected to the Internet.

Keywords: Quick response; Electronic book; Electronic library; Unique QR.

1. INTRODUCTION

Barcode technology is flourishing, which includes encoding data, easy to print, identify and processing data that is based on computer and information technology [1]. Further from the benefits of 2D bar codes, QR codes have a lot of features like ultra-fast responses, comprehensive readability, offline applications database, and numerous efficient representations of letters, characters, pictures, and so on [2]. When compared to barcodes, 2D barcodes offer significant benefits in terms of data capacity, data types, and data recovery. Two-dimensional codes are split into linear and matrix barcodes based on their realization principle, structure, and shape variances, and their primary uses include services management, restaurant orders, applications of security, ticketing systems, authentication access, and many business transactions, etc.

QR codes are able to transmit the messages fast with high reliability, with a low cost and large capacity for message transmission. The Quick Response code contains a variety of information, including link switching, location information, a time stamp, and the accompanying platform user ID [3]. Conventional Universal Product Code contains decoded data in one direction i.e. vertically into bars and house in between; whereas QR Code contains decoded data in each direction i.e. vertical and horizontal direction. QR code is capable of holding an additional volume of information than a barcode, which is even a whole bunch of times as abundant data [4]. QR codes essentially have two-dimensional (2D) matrices codes that able to be scanned with just a camera on decent and smartphones running a QR reader as the default application to access material that already included such as website addresses, E-mail addresses, catalog item details, and phone numbers [5].

After a detailed explanation of the QR code technology, the proposed system for e-books will be presented in this paper, will encode a brief summary of each book, in addition to a unique identification number for each book. When entering the books into the system's database, the system automatically generate the unique QR code, will be used to assist office operations such as quick searches, tracking loaned books, and their availability, among other things. Many examples of issues that frequently arise in manual library processes such as the time has been spent on borrowed, extending, and returning transactions, the complexity of tracking books and other borrowing materials, the duration of compiling reports, the spending time for checking if the user or student has brought back the book, and the protection

of the book from the thief. Another important criterion is that the implementation costs be kept as low as possible using a computer-based information system to manage a library allows library employees are responsible for keeping track of the borrowed material and preparing a report [6]. The QR code it is considered of a technology that could be utilized in a library management system, and the suggestion of using QR codes for libraries has several advantages, including a quick process [7], the ability to store large amounts of data, which using this technology (that need a camera for reading code) will be assisting to improve service quality by shortening borrowing and returning transactions and increasing circulation.

2. QR CODE CONCEPTS

QR codes created by Denso in 1994. A QR code differs from a regular barcode in that it contains both vertical and horizontal information and is not confined to one dimension [8].

QR codes have a maximum storage capacity of 7,089 digits, whereas a standard barcode has a maximum of 20 digits. QR codes are square in design and have little squares in three of their four corners [9] as shown in figure (1)

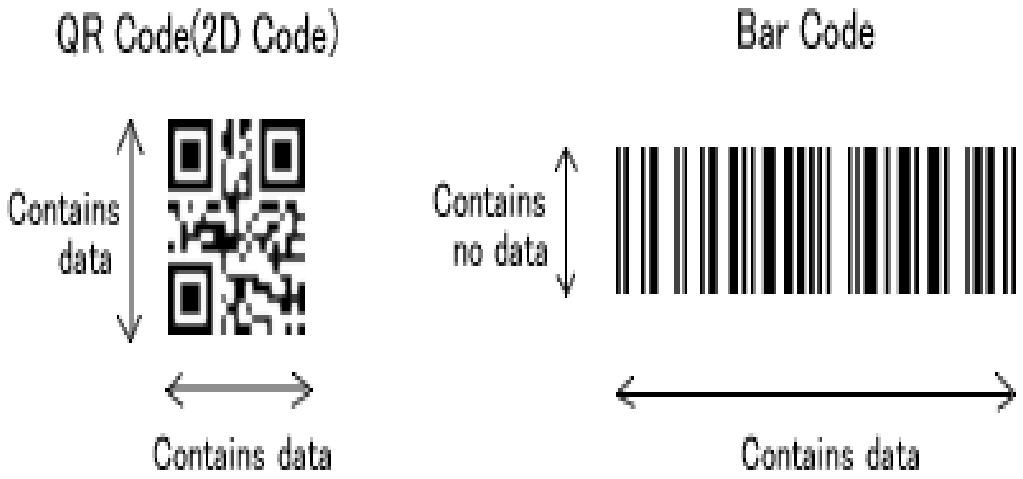

Figure (1): QR code Vs. Bar code

The region covered by three corners that contain encoded information, each individual QR code have an encoding region and function patterns, as shown in figure (2). The finder pattern, timing pattern, alignment pattern, quiet zone, and cell are included in the function patterns. Where the finder pattern has three QR code corners, and have a structure that can be the area encompassed by these three corners have encoded data. As shown in Figure (2), each QR code has its own encoding region and function patterns. The finder pattern, timing pattern, alignment pattern, quiet zone, and cell are all examples of function patterns. The finder pattern resembles the three corners of a QR code and has a structure that can be recognized from any angle (360°). To repair the QR code distortion, the alignment pattern's central position will be established. For this, a black isolated cell is used, and the timing pattern is used to correct the data cell's central coordinate or when there is a cell pitch error, and it is arranged in both vertical and horizontal directions [10]. After that, the cell will be saved in the data area.

QR codes can convey images, text, or audiovisual data and are frequently used in manufacturing, logistics, and sales [11], especially in specialized fields like data concealing and automated data storage.

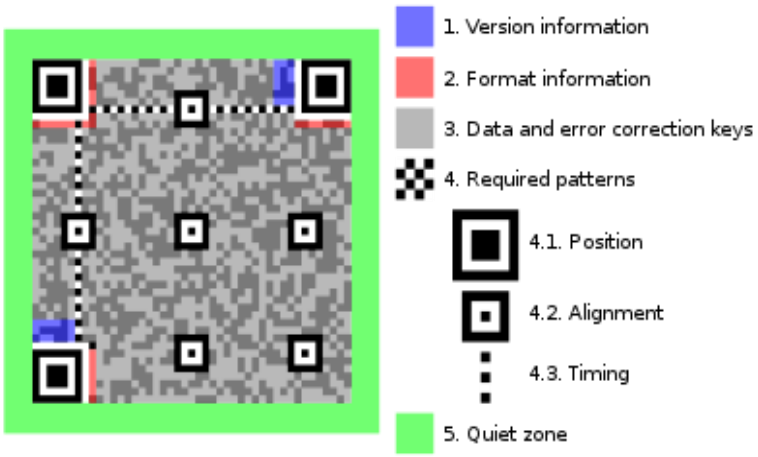

Figure (2): Structure of QR code

A QR code is divided into 40 sizes version as a standard, each QR code version has a varied number of modules, with each version having four more than the previous one [12]. For example, Version 1 has 21x21 modules, while Version 2 has 25x25 modules, and so on. As seen in the diagram (3).

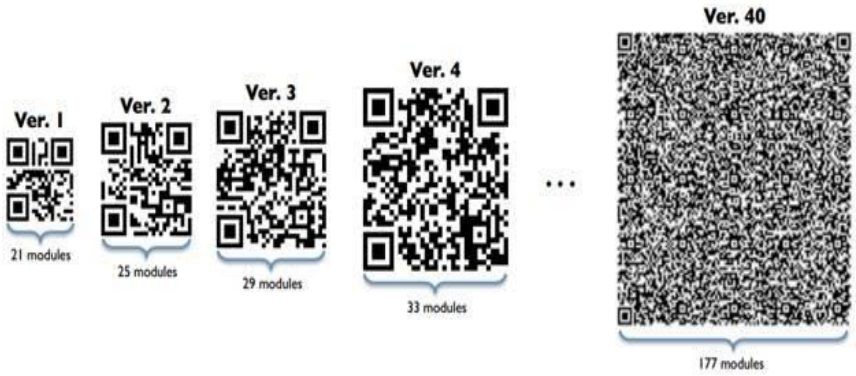

Figure (3): The comparison size of 40 version of QR code

3. PROPOSED SYSTEM

The process of generating the QR code for books is done by a software process from within the electronic library system (the proposed system), where the e-book data entry interface allows adding much information about the book such as the title, brief synopsis, book category, and other details.

From the same data entry interface, the QR code will be generated that contains all the information entered in addition to a unique identification code for each book.

The process of converting the book data entered into the system to the QR code with the push of a button through a software code specific to the system, meaning that the process of generating the QR code will be integrated through the system itself.

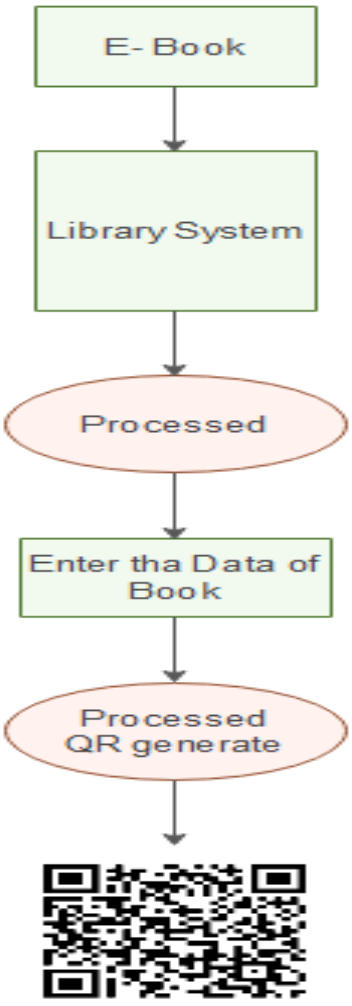

Figure (4): The process of generating QR code

This system will facilitate multiple office operations such as follow-up of books and ease of access by beneficiaries, in addition to a comprehensive management process in an electronic manner, all of this will be done by relying on the QR code by scanning this code with any QR code scanner application on the computer or mobile using the device's built-in camera.

The process of identifying the code is easily done through the use of QR code scanning applications using the camera of the mobile or tablet, so all the included information in the QR code will appear that facilitates the process of viewing and knowing the idea of the book without entering the book's details or downloading it from the electronic library system.

4. RESULTS AND DISCUSSIONS

The system provides quick and easy access to electronic books, in addition to the process of generating the QR code for the stored books, will review some results of the completed system and how to work with the QR code.

The main part of the system is the process of entering electronic books and information about each book in order to generate the QR code. After completing entering the data in the system database, the process of generating a unique QR code with the book's information is done through a special interface for the system supervisor, as shown in figure (1).

Figure (5): The interface page of book's information with generating QR code

The special section is about the QR Code, which is very important and very easy to use, and the idea is for arrangement and speed. When the book ID is written, a special QR code is displayed that includes the manual for the book, what it talks about, and the identification code for the book in the library. This is the first way to use the identification number of the required book, as shown in figure (6). Where in the event that the user has the unique identification number of the book, will be able to enter the number and identify the QR code.

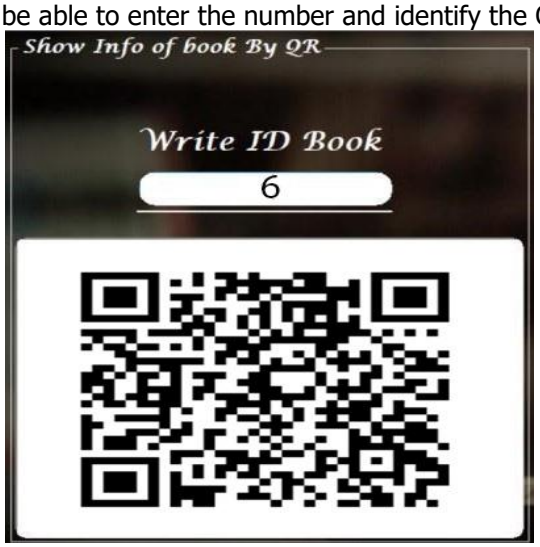

Figure (6): search by book ID to view QR code

Or the second method, in the event that the user does not know the identification number, will search for the title of the book by search box specialized in the general books' page and then scan the QR code for the book to verify its details. As shown in figure (7).

Figure (7): The general page for searching books with its QR code

5. CONCLUSION

The recent development in information technology and the development in the electronic library system is an important development that is highly needed. The entry of technology into the simplest details of our lives made its importance not limited to one thing without the other, in a more precise sense, it is not limited to products only or to programs only, it has become our way of life and an important part of life details.

The establishment of an electronic system in the field of electronic books makes dealing with books easier and more accessible, due to the ease of interaction through mobile devices without the need for special devices and specific technologies.

The use of technology such as the QR code in the system works on quick access, reducing fatigue and organizing work, in addition to maintaining the consumption of little storage space.

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