Analysis of Barcode Scanning and Management

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Abstract

In today's fast-paced world, people like things in shortcut – quickest, fastest, easiest, least effort path paradigm – and obtaining information is no exception. A trend can be observed in the market, of scanning codes of whatever project details they want to look at. These include details of products, phone numbers, addresses, features of the product and other facts. Many people would prefer to scan a code and get all relevant data about the product/website or object they need information. What such users need is an application that will run on their smartphones and quickly and accurately get them the data they want about a product/website / any related object or article. This is an easy way of data transmission that does not require internet or network connectivity. Such an application would increase the effectiveness and productivity of work. The means to scan and get data required on one's device is a huge advantage as they can use it for future references.

1. INTRODUCTION

Barcode or commonly referred to as a linear code, or 1D code is a machine-readable representation of data which was initially represented as widths and spacings of parallel lines. 2D variants were later developed using geometric patterns, called matrix codes or 2D barcodes. They can be read using a barcode reader or scanner installed on any device.[1]

Quick Response Code or QR code is a matrix of dots containing the data which can be scanned using a mobile phone-based scanner or other devices which enable QR Code scanning. The application first scans the code and then converts in into text performing the required task. A QR code can provide essential data, details about a product, link to a youtube video or forms, etc. All QR Codes have the same square shape with three outlines at three corners of the code which determine its orientation.[2]

1.1. Need

With increasing digitization, small-scale and large-scale businesses implemented the use of QR Codes for various purposes. QR codes may be generated for each product containing product details, links to YouTube videos, contact details, etc. QR Codes can be added to business cards containing contact details so that it can be easily added to the phone's memory.

Add them to any print advertising, flyers, posters, invites, TV ads etc. containing:
- Product details
- Contact details
- Offer details
- Competition and payment details
- Google Forms
- Twitter, Facebook, Instagram IDs
- YouTube videos

1.2. Basic Concept

1.2.1. QR Code Generators and Scanners

QR codes, also known as Quick Response Codes, are barcode subsets. Information is contained both horizontally and vertically in a QR code and can be read through a code scanner.[3]

The basic technologies in QR Codes are:
- QR code generators: The QR generators can generate QR code for any provided data. There are various online software available which can generate code. They can perform any required action like directing to a website, making a call, etc.
- QR code scanner: Code scanners are available in various forms, but the most widely used medium is mobile phone-based scanners. They are available for installation on both iOS as well as Android operating systems. They can successfully scan the QR code and show the results and, if required, redirect you to a particular website, form, or video, etc.

1.2.2. Why Android
- Biggest Smartphone market

IOS and android ecosystems are a huge number of users. However, research indicates that the Android operating system platform is larger and growing faster than IOS.

A most recent study reported that Android has an overall 84.4% market share versus 14.4% for IOS as shown in Fig. 1. As of March 2013, approximately 1.4 million Android devices are activated every day.[4,5]

• More Innovative

As the Android platform is ever-growing, it provides the developers with an opportunity to develop platform-specific applications. This creates greater competition and provides users with better applications to be used. This is an excellent opportunity for the developers to get more user-oriented and innovative while designing and creating their applications.

2. REVIEW OF LITERATURE

• "Efficient Security of Data by QR Code Encryption & Steganography"[6]

In this paper, the author focuses on the security of data when it is scanned through a QR Code reader. Every smartphone with an in-built camera has the capability to scan the code. The QR code is a matrix of data that encrypts data. Recently, the security and authenticity of information have become a big concern. So, providing data security has become a priority. This can be achieved using Steganography as it hides the data using text message, image, etc. and therefore ensures that third party members or devices cannot access it. In this paper, the message is hidden using a cover image. The latest approach is proposed for secret communication by combining the concept of steganography and QR codes. In the suggested method include two phases:

» Encrypting the text message by a QR code encoder and creating a QR code,
» Hiding the secret image inside the generated QR code. This proposed approach has to be employed in communicating confidential information.

• "Researchment and Realization Based on Android Database Application Technology".[7]

This paper uses SQLite and remote SQL server database for Android ecosystems as per the mobile platform to the meet the application's database needs. This paper also focuses on the functions of a web server, which enables an android application to access the database. The approach proposed in this paper can be applied to the mobile terminal platform and mobile business management system smoothly, with the better advantage of commodity and technical maneuverability.

• "QR Code Security and Solution" [8]

The identification of objects and places in the real world is very important, and QR (2-D printing) code is useful to store identifiers of them. Any camera cell phone device capture function can read content from a barcode tag directly. At the point when a barcode contains useful information or security data, the danger of security turns into an important issue. Because QR codes essentially highlight a square barcode with a special pattern, individuals have no clue whether the code will take them to legitimate data or a site loaded with malware. This paper examines QR codes how they can be used to attack human interaction and automated systems and their different data types, attack via QR codes and security arrangements, and some of the possible research areas while considering QR codes. However, since it is easy to modify the data stored in the 2-D Bar code, we should check whether the identifier written in the 2-D code is in reality issued by the authorized organization.

• "QR Code Analysis"[9]

This paper explains why QR and Barcodes were developed for different products. In 1960, when there was a major industrial growth, a wide range of products were introduced in the market for sale. This caused a big problem for the cashiers as they had to manually feed all product details and prices into the computer system. This caused problems like wrist pains and carpal tunnel syndrome. To overcome this problem, QR and barcodes were introduced. The barcode contained all information related to the product and hence reduced the time and efforts of cashiers. It also gives an insight into the issues faced when using barcodes for a product.

As not everyone is aware of QR codes, they won't immediately scan the code when they see one. Also, not all mobile phones have a barcode and QR code scanner. The QR code sometimes contains links to a website that might not be mobile phone compatible. And above all, if the QR code is damaged due to transportation, then it is not possible to scan it to obtain data.

• "QR Code Scanning App for Mobile Devices"[10]

This paper summarizes the use of QR codes and Google Glass™ to accomplish multi-purpose activities. In this project, Google Glass™ was chosen as a primary target device. It simplifies daily tasks and avoids time wastage. The glass eliminates the tedious task of scanning QR codes through mobile or any other device-based scanner. With this
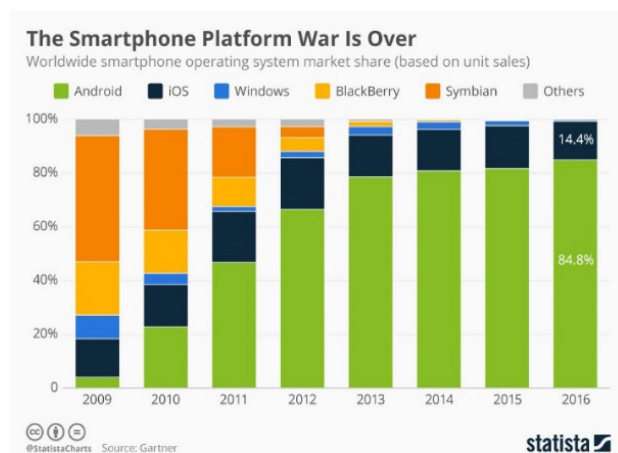

Fig. 1: Operating System Market Share

glass, all the user has to do is ask the glass to scan the QR or Barcode. With the command, the scanner app begins its work, and the user interface initializes. If the code is valid, the application prompts a dialog box with a text message containing the link. This project takes the QR Code scanning and its operations to the next level of digitization.

3. PROBLEM STATEMENT

With the drastic increase in the use of digital gadgets such as personal computers, smartphones, and tablets, most daily jobs are now performed digitally. This makes everything easier, faster, and more efficient. Given the option, most people today would prefer doing things electronically rather than sitting down with a pen and paper.

In fact, given the option, people would prefer clicking a picture instead of typing things out manually. The documents can be scanned on a mobile device, which helps in the easy transmission of data. However, a scan is merely an image capture of the original document, so it cannot be easily broadcasted or transmitted to other people. This results in a decrease in public attention as the information is not able to reach its intended crowd. QR and Barcode scanner solves this issue by saving all data in a QR / Bar code.

What such users need is an application that will run on their smartphones and quickly and accurately get them the data they want about a product/website / any related object or article. This is an easy way of data transmission that does not require internet or network connectivity.

Such an application would increase the efficiency and effectiveness of work. The ability to instantly scan and get data required on one's device is a huge advantage as they can use it for future references.

4. PROPOSED SYSTEM

The solution is to use three individual systems for QR code generation, Android Application for scanning codes, and application for Business Analysis.

The android application uses the device's default camera to scan to the QR Code. Then converts it to obtain the result.
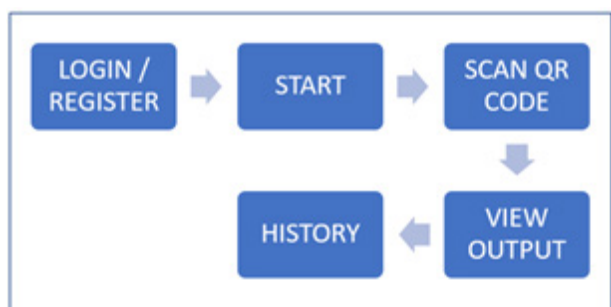

Fig. 2: Proposed System

The basic needs and flow of the application are:
- User starts app
- User clicks a button to start scanning
- User holds the phone over the QR Code and scans the code
- App processes the QR Code
- Result is displayed to the user
- Result is saved in the history

The app will turn it into copy-able text you can then paste anywhere in your phone—a document editor, your note-taking app, Gmail, SMS, or anything else you could imagine.

To make the above possible, the following login/ register $\Rightarrow$ input $\Rightarrow$ process $\Rightarrow$ output$\Rightarrow$ history layout is required (shown in Figure 2).
- Login /Register $\Rightarrow$ Obtaining details about new user and saving them as login credentials
- Input/Start $\Rightarrow$ Scan QR Code using the app
- Process $\Rightarrow$ QR Code conversion module
- Output $\Rightarrow$ The result of scan
- History $\Rightarrow$ View previews scans

4.1. Requirements/features
- Lightweight application
- Supported by highest possible percentage of Android phones
- Reasonably high and consistent accuracy
- Reasonably less response time
- Attractive but easy to use interface
- A self-contained application requiring no internet and data connection charges
- Basic help screen for detailed usage help
- Scanned result can be shared with any other app installed on your phone that accepts text like Facebook, SMS, Bluetooth, Gmail, Twitter, WhatsApp, Dropbox, Google talk, etc.
- User can view scanned QR code history
- Doesn't save any information on 3rd party systems, so user's data is completely private

5. IMPLEMENTATION

Android Studio has been used to implement this model. Java programming language has also been used to program certain modules.

The QR and Barcode Scanner application is developed using Android application development and has a database backup, which is provided using SQLite Database.

Barcode generator application is an Excel macro created using Excel VBA visual basic application. There is a developer option in excel which can be used to make macros. Macros are nothing but programs that automates a task. Basically, what barcode generator does is whatever

text we insert in type here text bar and click on generate barcode. The macro runs and gives an output of barcodes and QR codes of various sizes. These barcodes can be generated in a fraction of seconds. And any editing can be done here and there. Many barcodes and QR codes can be generated simultaneously.

The organization data is analyzed using R Language. The module uses a sample data set with all required data to analyze data and display profits based on the same. It shows the results using graphs and histograms.

6. RESULT

After successfully implementing the project, the results for barcode scanning and analysis are as follows:

The generator is first used to generate a barcode for the required text. Fig. 3 demonstrates the barcode and QR code generator module interface.

When the application is opened, a register page opens wherein the user must register first to create an account. Fig 4
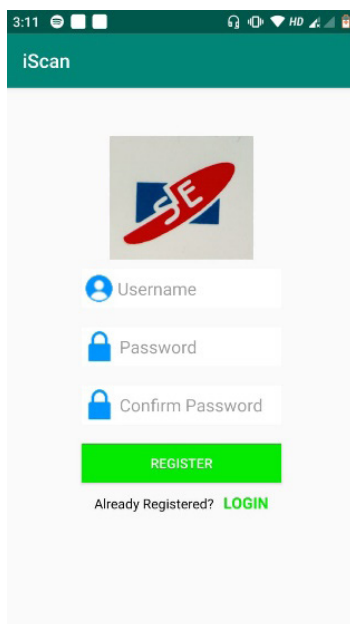

Fig. 3: Barcode Generator

If the user has already signed-up he must login to his/her account.Fig 5

After the user logs in to his account, an information page opens, which gives all the information about the user can use the application.Fig 6

The user can then scan a code Fig 7 or view scanned history.Fig 8

After the QR code is scanned, the result is then displayed on the screen and saved in the database.Fig 9
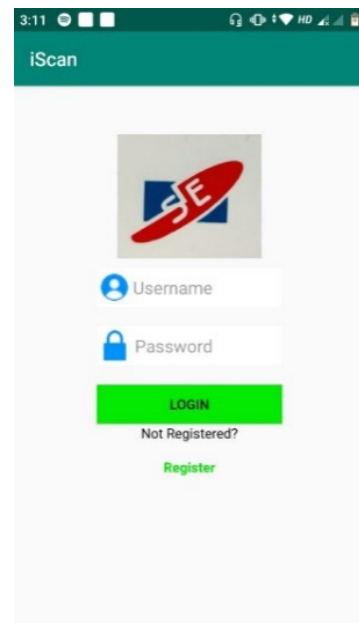
Later the company data is analyzed to obtain results
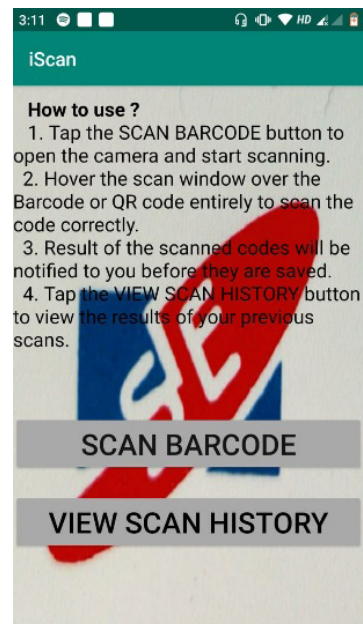

Fig. 5: Login Screen

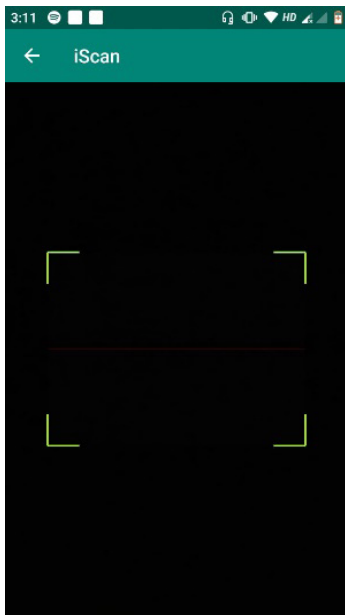**Fig. 4:** Register Screen

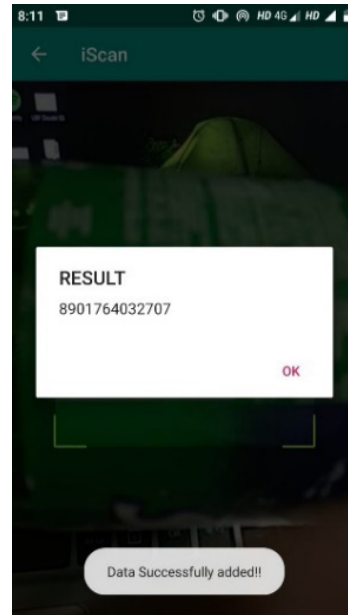**Fig. 6:** Info Screen

Fig. 7: Scanner

Fig. 9: Result

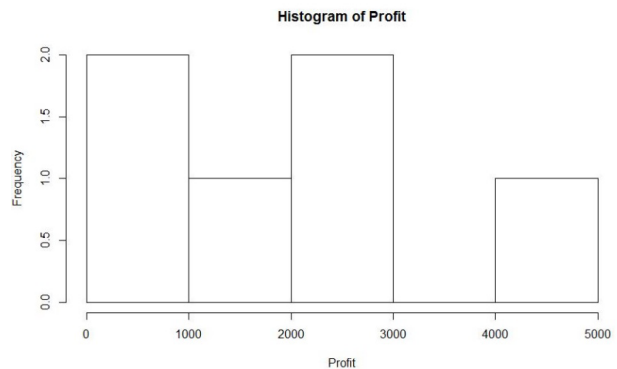**Fig. 8:** History Screen

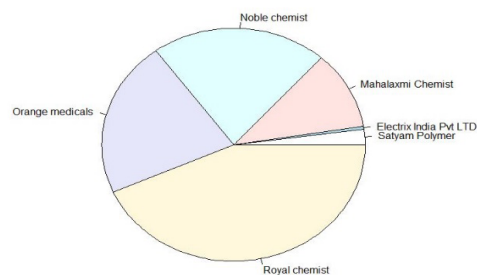**Fig. 10:** Histogram Display of Profits

Fig. 11: Pie Chart Based on Data

in the form of histogram and pie chart.

The histogram in Fig. 10 shows the profits of the organization generating QR Codes. This Fig. demonstrates the profit ranges based on the data feed into the system.

The pie chart depicted in Fig. 11. shows the percentage of QR and Barcodes generated for all the institutions, firms, organizations affiliated to the Generator organization.

7. CONCLUSION

This paper summarizes the application used for barcode scanning and analysis. The project uses three different modules to generate and scan the code and to analyze the organization data to display profits in terms of graphs and histograms. It also ensures proper storage of scanned data, which can be viewed in history and can be used for future

reference. The advantage is that the program provides data security as the data of an organization is confidential.

The system can be used by all the organizations dealing with QR and Barcodes. With the ever-growing demand and supply of goods, it also increases the need for proper use of QR and Barcodes and its maintenance. Also, for an organization generating QR and Barcodes, it is generally difficult to maintain records as a mobile application does not scan the codes and store the data efficiently at the same time. The system will not only scan and store data, the future scope is also to analyze the data to give results based on graphs and charts.

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