COLOR QR CODE IMPLEMENTATION USING IMAGE PROCESSING

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Abstract: A 2D color barcode can hold much more information than a binary barcode. While a color barcode can hold more information, it makes this vision task unusually challenging because of the varying color balancing in different cameras, poor quality of images taken with current cell phone cameras and webcams, varying lighting conditions, arbitrary rotation of the barcodes in images. They are frequently used in advertising to provide customers with scannable URLs to product websites. In pursuit of increased barcode capacity, novel schemes using color have been proposed.
Encoding data independently in cyan, magenta, and yellow (CMY) print colorant channels with detection in complementary Red, green, and blue (RGB) image capture channels offers an attractive framework for extending monochrome barcodes to color with increased data rates. The undesired absorption of colorants in regions of spectral sensitivity of the no complementary capture channels, however, gives rise to cross-channel color interference that significantly deteriorates the performance of the color barcode system. This provides a better decoding of data along with higher data rates.The paper provides an overall look on QR codes.

Keywords: DCT, DFT, Color QR

I. INTRODUCTION

As in Barcodes are optical machine-readable representations of data, capable of storing digital information about the physical object to which they are attached. Due to their reading speed, accuracy, and functional characteristics, barcodes have become ubiquitous in many applications, including their usage in department stores and retail chains to price goods, to track items and to identify customers through membership cards; in tracking item shipment and movement, such as express mail, rental cars, airline luggage; in patient identification in hospitals; in document management systems; in ticketing for sports events, cinemas, theatres and transportation. Barcodes in broad has two dimensions. The first one referred to as one-dimensional (1D) barcodes; represent data by varying the widths and spacings of parallel lines. The amount of digital information stored in 1D barcodes is limited and could be simply increased by increasing the number of barcode digits or by laying out multiple barcodes. This approach has many negative effects, however, such as enlarged barcode areas, more complex reading operations, and increased printing costs. Again if one or bars in the code is lost whole barcode becomes unreadable. For this reason, the barcode technology has been deploying geometric patterns in two dimensions: such barcodes are referred to as bidimensional (2D) codes. Note that 2D codes increase the data space available by storing information in two dimensions, whereas 1D code contains data in one dimension only.
Figure 1.1 shows examples of 1D and 2D barcodes. Available 2D codes span from repeating a single 1D barcode over multiple rows to exploiting bi- dimensional shapes in order to represent data. Figure 1.2 illustrates the evolution of 2Dbarcode technology. In particular, Figure 1.2 (a) shows a multiple barcode layout: the main disadvantage related to this simple 2D layout is the need of multiple scans in order to get all the information contained in the barcode. Figure 1.2 (b) illustrates a stacked barcode layout: in this case one single scan is enough to obtain the stored information but the scanning equipment must be carefully aligned with the barcode orientation. Finally, in Figure 1.2 (c) a matrix barcode layout is presented: this layout enables to acquire information with one single scan and does not require the accurate alignment of the scanning equipment. This completes a brief introduction about barcodes. Now we will have a look on details about 2D barcodes.

1.1 2D BARCODES

There are a lot of varieties of 2d barcodes available[5]. They can be widely divided into two: Database 2D Barcodes and Index-Based Barcodes. The database 2D barcodes were initially invented to improve data capacity for industrial applications .QR Code, VSCode, and Data Matrix belonged to this type. The working of these codes can be integrated into mobile phones with built-in cameras that can scan and decode data, allowing these 2D barcodes to operate as portable databases, letting users access information anytime, anywhere, regardless of network connectivity. The VS code that uses encrypted format of data makes the mobile applications secure and useful in biometric applications. But again the absence or presence of a very small quiet zone makes the decoding inefficient. In the case of data matrix this is solved by the use of two types of border but again

distortions within the image cannot be handled. The compression of data for compaction makes its decoding complex.

The other type index-based 2D barcodes take into account the reading limitations of these built-in cameras. The Visual Code, Shot Code, and ColorCode belonging to this take into account the reading limitations of these built-in cameras. They have a much lower data capacity than database 2D barcodes, but they offer robust and reliable barcode reading. Each barcode basically works as an index that links the digital world to the real world, so these barcodes require network connectivity. Going to the case of Visual codes they have a good detection capability with structure but the data capacity is very less(max 83 bits). Shot Code has an aesthetic round shape but this again makes decoding bit complex and understandable. Colour Codes use set of colour and work on it. This has a good data capacity but the problems caused by illuminations are still a challenge.

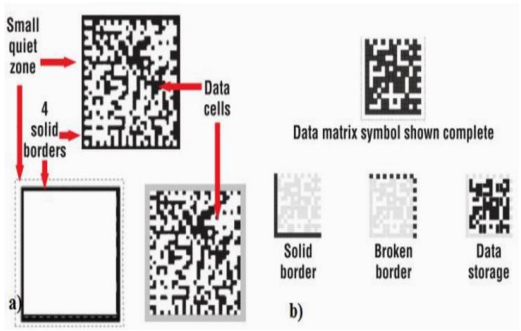
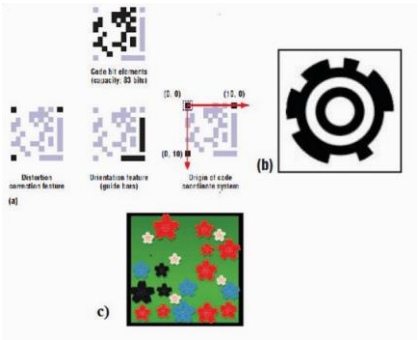


Fig Different types Of Database Barcodes-a)VS Code b) Data Matrix



II. LITERATURE REVIEW

Anjaly Raj, vidya N [1] a survey on data security and confidentiality using 2D color barcode, 2D color barcode can hold much information in comparison to a binary barcode.2Dcolor barcode technology increase the data density and robust data transmission. Color barcodes increases the data embedding capacity than normal 2D barcodes. Here the message had been encrypted with the help of cryptographic which uses color QR Code (Quick Respond Codes). The embedded QR code may be sent to destination or may be saved for future use. Color QR Codes are mainly used to communicate and store data because they have higher or large storage capacity than any other normal conservative _barcode‘s. The data is encrypted using asymmetric key, and then inserted in color QR code, so that data cannot be easily retrievable without adequate authorization / permission. This paper studies two dimensional color barcodes for data confidentiality and security. It provides high level security and data confidentiality. It is also used for private information sharing.

Aryachandran S1, Jyothi R L [2] this proposed work based on secure color (QR) Quick Response codes have become the efficient and 2D barcodes improved the condition. QR codes, the most popular 2D barcodes are widely used for the purposes other than product identifications. 2D barcode by its features and comparative study of 2D barcode. Data rate of QR codes can be enhanced by using the colors. Replacing the black and white by Cyan-White; Magenta-White; and Yellow-White enhances the data rate by a factor of three. Now the security can be enhanced by the use of password protection. The password protection is enhanced by xor encryption. This paper also discusses why we go for password protection rather than the classical encryption color.

D. Antony Praveen Kumar, M. Baskaran, J. Jocin, Mr. G. Diju Danie [3] this work is concerned by implementing Steganography for images with the improvement on image security and image quality. Here the algorithm is used LSB (Least Significant Bit). The LSB method is one of the best methods for hiding the message. It helps to transferring of the message from one place to another place in secure manner. But, in today‘s retrieval of hiding message possible to the third person. All kinds of message are stored into the cover image based on LSB. One of the main problem is that stored messages are may be retrieved by another person, because previous method partially hidden the message. It is the process with the help of improving the steganography method using QR-code data input pattern image and LSB technique in RGB image. In this proposed work shows that the proposed work of the message transfer successfully in secure manner based on Least Significance Bit method and QR code pattern image. Thus the proposed system is to increase the system performance.

III. PROPOSED MEHODOLOGY

A color QR code generator encrypts the given message into color QR codes which could not be read or understood by human beings. But the message hidden in these color QR codes can be easily decoded by any smart phone with built in camera. In order keep the message secret and to protect it from unauthorized access a new method is suggested by merging color QR codes with cryptography and Steganography technique. In this proposed method an encoding process at the sender and a decoding process at the receiver.

A. Encoding Process: The encoding process involves encryption of the secret message into color QR codes followed by:

1) Select the secret text or data.
2) Encode it into a color QR code using any color QR code generator
3) Read a color image and embed the quantized bits of the color QR codes in the pixels of the color image using DCT and DWT method.
4) Save the stego image.

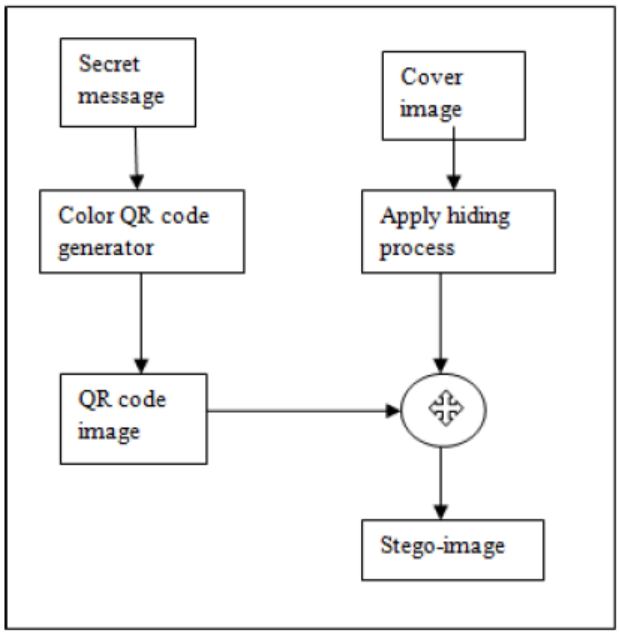
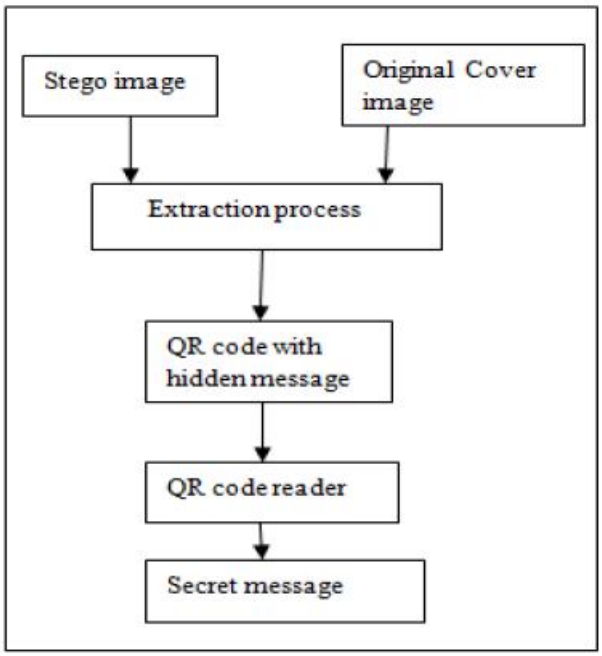


Fig: Encoding Process



Decoding Process

Algorithm:

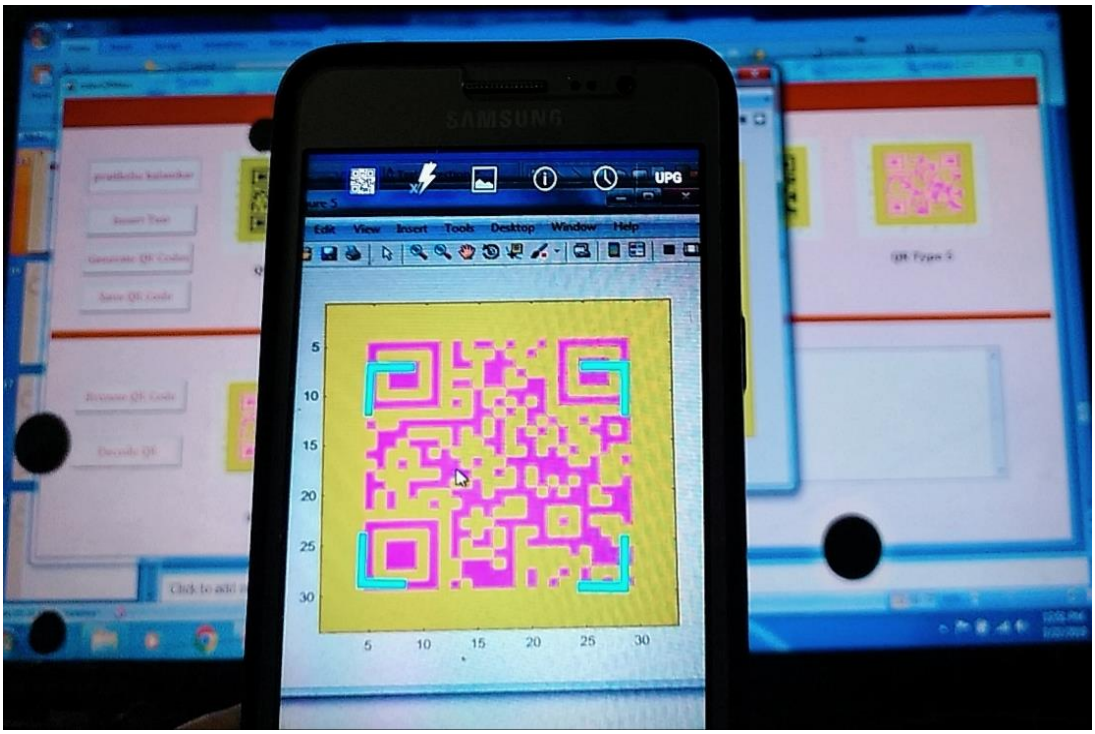
Encoding Algorithm
1. Enter the users data to generate the QR code
2. Convert the entered data into its ASCII equivalent
3. Using the ASCII equivalent Finite Fields Numbers are generated by using Primitive polynomial
4. Codeword is generated for data
5. The codeword is converted into its binary Equivalent
6. These bits are placed according to the QR code pattern
7. Each users QR code is considered as a color plane
8. Combining the three color planes, colored QR is generated.

QR DECODING ALGORITHM
1. Read the color QR code
2. Split it into RGB planes
3. For each plane eliminate the QR patterns
4. These bits are grouped into 8 bit representation
5. Convert the binary to decimal for each byte
6. Apply to decoder as input
7. The output of decoder are ASCII equivalents
8. Converting them into characters gives the original information

IV. CONCLUSION AND FUTURE SCOPE

QR codes are the most popular barcodes that are most useful in all the cases. The paper has gone through different available two dimensional barcodes and has seen that QR codes perform the best. Now the advantages of colors are incorporated with qr code to improve its efficiency. Using colors will increase the data rate as well as complexity in its decoding. Although, bit error rates and therefore information capacities vary across the three resulting channels, the error rates are in ranges that are readily handled by the error correction coding options available for monochrome barcodes. Efficient methods can be adopted for its decoding. We have DCT and DWT technologies in association with zing QR API from github to generate QR based in QR parameter. Using color QR we have generated high capacity QR that is accessible via Android as well.

USER INTERFACE IN MATLAB



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