Implementation on Two level QR Code Generate for Secure Message Sharing and Document Authentication System

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Abstract: **Quick response codes or QR codes are increasing their popularity as they appear in more places in the todays scenario. Quick Response Codes can be considered as physical hyperlinks that give the ability to users to access information, share messages and authenticate the documents. Apart from marketing, QR Codes have been also adopted in different areas such as the on-line payments. As the usage of QR codes is increasing day by day care must be taken while designing the QR code so that there arent any issues regarding its security and privacy. In this paper we have proposed a technique known as 2 level QR code which consists of two layers of security provided to the QR code. The first level is known as public level and the second level is known as private level. We will be using Reed Solomon algorithm. Our two level architecture is capable enough to provide ample security and privacy as far as private message sharing and document authentication are concerned. In this paper we have studied various state of the art existing techniques of designing QR code along with their comparison with the our proposed 2 level QR code technique.**

Keywords- QR Code; Reed solomon.

I. INTRODUCTION

Quick response codes or QR codes are basically a two dimensional bar codes which are used day by day due to the technological advancements [1]. These codes have plenty of applications. To name a few, these QR codes can be used for storing information (advertising, museum art description), web site redirecting, tracking and tracing (for transportation tickets or brands), Entity identification (passenger information, super- market products), Uniform resource locator, Code payments, Virtual stores, Website login, Message sharing and document authentication. QR code is also known as matrix barcode. QR code was invented by Denso Wave in Japan while working for automotive industry. Due to the technological advancements there are plenty of QR codes which are being used in the market. As a result of which the demand for QR code scanners has also increased proportionally. The popularity of QR code is due to its robustness, easy to read feature, higher encoding capacity and small size. Although it has many advantages but still has many downsides to be improved upon most common disadvantages are: It is easily accessible to anyone even if it is ciphered and it is very difficult to distinguish between the originally generated QR code with its photocopy. So, in order to intrude the QR code, any third person can retrieve the information with the help of a standard QR code scanner. As far as message sharing and document authentication are concerned the security of the QR code is our highest priority. In order to overcome these shortcomings we have proposed a Two level QR code with enhanced encoding technique. This enhancement is achieved by using textures patterns in place of black modules. These patterns are sensitive to the distortions created while printing and scanning process.

Our proposed technique also lays emphasis on storage capacity apart from security and privacy. Our proposed system consists of a public level QR code and a private level QR code. The public level QR code can be accesses with the help of any standard QR code scanner whereas the public level QR code cannot be accessed from any standard QR scanner. Hence it provides a level of security against any possible intrusion to greater extent. The first level keeps the strong characteristics of the QR code whereas the second level improves the storage capacity of the QR code. This paper is as follows: we start with the overview of QR codes and in the subsequent sections we will be mainly exploring the state of the art existing techniques along with the proposed technique. And at the end we will compare our technique with the existing techniques.

The QR code generation algorithm consists of information encoding using Reed-Solomon error correction code, information division on codewords, application of mask pattern, placement of codewords and function patterns into the QR code. The QR code recognition algorithm includes the scanning process, image binarization, geometrical correction and decoding algorithm. The simplest type of rich QR codes is the user-friendly QR code. The target of these codes is to improve the aesthetic view of QR codes. It consists of changing the colors and shape of the modules, or of adding an image into the QR code.

Fig.1 Comparison of standard QR Code(a), with (b)proposed private QR code for private message sharing and (c)proposed code for authentication

II. LITERATURE SURVEY

M. Querini, etal has invented "2D color barcodes for mobile phones," In 2011. Barcodes are optical machine readable representation of data, capable of storing digital information about the physical object to which they are attached. Due to their reading speed, accuracy, and functional characteristic, barcodes have become ubiquitous in many applications. R. Kakarala ,etal has invented "Visually signicant QR codes: Image blending and statistical analysis," in Jul. 2013 QR codes are widely used as a means of conveying textual information, such as emails , hyperlink, or phone numbers, through images that are interpreted using a smart phone camera. T. V. Bui, etal has invented "Robust message hiding for QR code," in Aug. 2014 The concepts of QR code is an automatic method to hide information using QR codes and to embed QR codes into color images with bounded probability of detection error.

Robust picture hashing Author: R. Venkatesan, S.- M. Koon, M. H. Jakubowski, and P. Moulin Portrayal: In [7], creator presents a novel count that uses a wavelet representation of pictures and new randomized get ready frameworks for hashing. They presented a photo hashing computation that progressions over pictures into short, generous piece strings. Using this figuring, can consider two pictures by checking no great strings for clear correspondence, rather than trying the substantially more included issue of taking a gander at "fluffy" picture data. Picture hashes were effective to various ambushes, including both normal picture planning and malignant twistings. The hashing figuring joins diverse musings from the fields of slip-up changing codes, and cryptography

Wave Atom-Based QR Image Hashing Against Content- Preserving and Content-Altering Attacks Author: Fang Liu(&) and Lee-Ming Cheng In [8], Author have proposed a hashing arrangement in light of wave molecule change and randomized pixel change, which is fitting for picture content approval, picture database recuperation. The proposed computation can check the photos which have encountered essential substance secured picture get ready operations, for instance, weight, filtering, uproar development besides the geometric control. It is at the same time sensitive to poisonous upsetting the affirmation of system security. Instead of using routine change like DWT, DCT or other change, They have propose to use wave atom change for the sparser improvement and better qualities to think creation highlights when differentiated and others.

Geometric contortion strong picture hashing plan and its applications on duplicate location and verification Author: Chun-Shien Lu Chao-Yong Hsu In [9], The real impediment of the current media hashing innovations is their constrained imperviousness to geometric assaults. Creators have proposed a novel geometric mutilation invariant picture hashing arrangement, which can be used to perform copy area and substance confirmation of cutting edge pictures. a circumstance of copy ID and taking after is given to plan how a photo hashing system can be used to regulate modernized picture substance. Given a photo controlled by its creator, a photo copy revelation sys-tem prerequisites to find out whether illegal copies of the photo exist on the Internet and, if they exist, give back a summary of suspect URLs. This substance looking for approach can be capable by technique for picture hashing, and the yield of the hashing structure can offer proprietors information about unapproved usage of their significant media data. The hash database used for addressing and looking for can be understood a detached from the net way. As needs be, time is basically spent on cross area based hash period of a moving toward request picture. In any case, Their arrangement compensates for this cost by offering power against geometric twisting. A speedy organizing system has moreover been proposed to quicken looking for in a broad picture database.

A Model-based Image Steganography Method Using Watson's Visual Model Author: Mohammad Fakhredanesh, Reza Safabakhsh, and Mohammad Rahmati In [10], Author proposes to utilize Watson's visual model to improve perceptual impalpability of model-based steganography. The proposed system checks ostensibly perceivable changes in the midst of embedding. To begin with, the best satisfactory change in each discrete cosine change coefficient is removed in perspective of Watson's visual model. By then a model is fitted to a low exactness histogram of such coefficients and the message bits are encoded to this model. Finally, the encoded message bits are embedded in those coefficients whose most noteworthy possible changes are ostensibly imperceptible. Exploratory outcomes show that movements coming to fruition due to the proposed system are perceptually indistinct, however show based steganography holds perceptually discernable changes. Their Experimental outcomes show that the proposed methodology does not hold any recognizable change in the photo while the model-based strategy holds various noticeable changes in the stego pictures.

Image Authentication by Content Preserving Robust Image Hashing Using Local and Global Features Author: Lima S Sebastiana, Abraham Varghese, Manesh T In [11], Author proposes a picture hash which is made from Haralick and MOD-LBP highlights close by luminance and chrominance, which are prepared from Zernike minutes. Sender makes the hash from picture highlights and attaches it with the photo to be sent. The hash is poor down at the gatherer to take a gander at the validity of the photo. The system recognizes picture imposter and finds the fabricated zones of the photo. The proposed hash is solid to essential substance securing changes and delicate to poisonous controls. The proposed hash is proper to picture approval.

III. PROPOSED TECHNIQUE

The two level QR code which is the proposed technique provides a two level security to the QR code which is mainly focusing on message sharing and document authentication [6]. The first level is known as public level and the second level is known as private level. The public level QR code will store the information which can be shown publicly. The private level QR code will store the information which is secret and private. When this two level QR code is scanned from any standard QR scanner, only the public message will be shown from the scanner whereas the private message will be safe, secured and hidden.

MODULE 1: INPUT MESSAGE.

This is our first module. In this module we will be giving the public and private messages as an input.

MODULE 2 : STANDARD QR CODE GENERATION.

In this module we will generate a standard QR code which will be created by encoding the public message. This QR code can be scanned by any standard QR code scanner. As far as standard QR is concerned, there is a pre defined library Zxing which has to be directly imported. That Library has got all the predefined methods in order to create a QR code. We just have to import a jar file known as Zxings core.jar file from Maven repository. Any QR code generated using the Zxing library can be easily scanned by a standard QR scanner.

MODULE 3 : 2LQR CODE GENERATION.

For creating private QR code, we will be using Reed solomons algorithm. Reed solomons algorithm is also known as Golays algorithm.

For creating the 2LQR code we will be performing the following two steps.

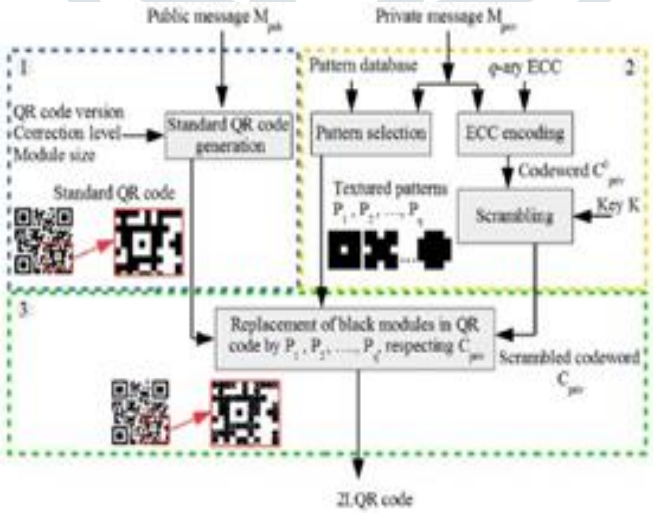
1) Pattern generation

2) Replacement of black modules of the std QR code with the generated patterns.

We will be selecting patterns from the database. We will create the patterns of all the alphanumeric characters along with the special symbols. And then we will store those patterns in a databse.

For example: Consider my message to be A. First we will consider the ASCII value of A.

That ASCII value is in decimal. We will convert that decimal value into binary. Afterwards, we will take a 3x3 Matrix comprising of the binary ASCII of A. The elements of the matrix will be either 1 or 0. So, the 1 will correspond to a black spot and 0 will correspond to a white spot. Similar process will be performed on all the characters. Finally we will get a pattern.



IV. CAMPARATIVE STUDY

Code name	Storage capacity (bits/inch²) public	private	total	Color printing	Copy sensitivity
HCC2D code [2]	15048	0	15048	Yes	No
Multilevel 2D barcode [5]	11224	0	11224	No	No
Graphical code for authentication	0	0	0	No	Yes
QR code with hidden message [3]	7548	3102	10650	No	No
Proposed 2LQR code [6]	7548	6386	13934	No	Yes

Table 1. Comparative study with existing and proposed system

V. FUTURE RESEARCH DIRECTIONS

In our future work, we can perform the following five ap- proaches for furthur improvement in our proposed technique. The first approach can concern the enhancements of the pattern recognition methodology. The second can cowl the rough- textured pattern analysis to alter its combination method. The third can deal with message sick and authentication attacks, such as cropping and code reconstruction. The forth approach can concern the study of the second level recovery issues within the 2LQR code pictures captured by a camera. Within the last approach, the storage capability of 2LQR code are redoubled by commutation conjointly the white modules with rough-textured patterns, which have tiny density than black pixels.

VI. CONCLUSION

In this a new rich code called two level QR (2LQR) code is proposed. This 2LQR code has two levels: a public level and a private level. The public level can be read by any QR code reading application, while the private level needs a specific application with specific input information. This 2LQR code can be used for private message sharing or for authentication scenarios. The private level is created by replacing black modules with specific textured patterns. These textured patterns are considered as black modules by standard QR code reader. Thus the private level is invisible to standard QR code readers. The proposed 2LQR code increases the storage capacity of the classical QR code due to its supplementary reading level. The storage capacity of the 2LQR code can be improved by increasing the number of textured patterns used or by decreasing the textured pattern size.

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