International Journal of Information Sciences and Application.
ISSN 0974-2255 Volume 8, Number 1 (2017), pp. 1-5

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Data and Image Sharing Using Two Level QR and its Authentication

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Abstract

A QR code is used for high speed reading application with some information storage. Here proposing an advanced QR code which has two levels. That are public and private level. The public level can be used for storing the public level information, which can be accessed by anyone using classical QR code reader. But the Private level can be used for text and image sharing which cannot read by a standard QR code reader. Information embedded in private level is encoded using q-ary code with some error correction capacity. Private level is constructed by replacing black modules by using textured patterns. The proposed scheme uses q-ary which helps us to increase the security and also storage capacity. For image embedding into QR Base64 string encoding is used. For authentication application here the textured patterns are sensitive to print and scan process. Pattern recognition method here used for viewing second level information and authentication application.

Keywords: Document authentication, Pattern recognition, Print and scan process

INTRODUCTION

Now a days for high speed reading application we are using graphical codes that are Barcodes, QR codes etc..These graphical code usage is increasing day by day with their application. These codes are mainly used for information storage, redirection to websites, advertising, Identification of passengers, supermarket products and also for track and trace application for transportation.

The proposed system overcomes security storage and authentication issues of existing graphical codes. The public level is just same as the standard QR code ie., existing system but the private level overcomes the issues of standard QR code. Private level uses q-ary code with error correction capacity. This encoding scheme gives the higher security and also if QR is damaged it can repair with ECC. Standard QR code has black modules and white modules, so in second level of proposed QR white black modules are replaced by using textured patterns. These textured patterns are P&S degraded versions, because of their print and scan sensitivity 2LQR [12] can be used for authentication application.

RELATED WORK

The QR code was invented for the Japanese automotive industry by Denso Wave1corporation in 1994 and its certification of QR code was performed by International Organization of Standardization (ISO). A QR code encodes the information into binary form. Each information bit is represented by a black or a white module. The Reed-Solomon error correction code [10] is used for data encryption. The lowest level can restore nearly 7% of damaged information, the highest level can restore nearly 30%.40 versions of QR code are avaialble now, each one has specific properties. QR code has specific structure orientation correction. One or more alignment patterns are used to code deformation adjustment. The code version and error correction bits are stored in the version information areas. QR code is generated by using standard QR code generation algorithm. The algorithm contains Reed-Solomon error correction code, information division on code words, application of mask pattern, placement of code words and function patterns into the QR code. For reading a QR standard QR recognition algorithm is used. It contains processes such as scanning process, image binarization, geometrical correction and decoding algorithm. Instead of graphical codes rich graphical codes are using now for increasing storage capacity and visual significance. They are also used to personalize the stored information such as contextual QR. Rich graphical codes are increase their visual significance without sacrificing error correction capability .Examples of rich graphical codes are HCC2D code, Contextual QR, multilevel QR code, rich DataMatrix code etc. The authors in [11] proposed to use the graphical codes for authentication.

EXISTING SYSTEM

In this time lot of graphical codes are using. But they have a lack of storage capacity and visual significance. To overcome this rich graphical codes are started to use[1]. These rich graphical codes are increasing their storage capacity without sacrificing error correction. To add visual significance multiple color QR codes are proposed. To give the personalized information another type of QR code is invented ie., Contextual QR code[2]. Contextual QR code information relates with a particular context. It is forwarded from contextual awareness system concept. Most popular code that enhances both the storage capacity and visual significance is HCC2D code. The authors increased the density and storage capacity of standard QR code by replacing

binary colored modules by RGB colored modules. The multilevel 2D barcode [3] also significantly improves the storage capacity of 2D code. The rich DataMatrix code, named unsynchronized 4D barcode[4], increases the storage capacity by using RGB colors of modules and time. It consists of the 9 colored DataMatrix codes displayed in sequence on the screen. But it cannot be printed. The authors in [5] proposed to use the graphical codes for authentication. The graphical code used is the copy detection pattern [6], which is a maximum entropy image, generated using a secret key, password or random seed. The authentication process is performed by the comparison of an original graphical code with the P&S graphical code embedded in the document.

PROBLEM DEFENITION

Graphical codes such as EAN-13 barcode [7], Quick Response (QR) code [8], DataMatrix [9] are more popular and familiar to most of the people. These graphical codes usage is increasing day by day because of their ease of handling. These graphical codes are easy to use, they are robust for copying process, easy to read and access by everyone. They also have a high encoding capacity with error correction capacity. But the these advantages also have some issues ie., information encoded in a QR code is always accessible to everyone, even if it is ciphered. Next issue is, It is impossible to distinguish an originally printed QR code from its copy due to their insensitivity to the Print and-Scan (P&S) process. The proposed new rich two level QR code overcomes these disadvantages.

PROPOSED SYSTEM

Our paper present a new rich QR code, that has two storage levels, it can be used for private message and image sharing and authentication process. This new rich QR code, named two level QR code (2LQR), has public and private storage levels. The public level is the same as the standard QR code storage level, so it is readable by any classical QR code application. The private level is constructed by replacing the black modules by specific textured patterns. It consists of information encoded using q-ary code with an error correction capacity. The public message is stored in the standard QR code, using the classical generation method described. The standard QR code generation algorithm includes the following steps. First of all, the most optimal mode (numeric, alphanumeric, byte or Kanji) is selected by analyzing the message content. The message is encoded using the shortest possible string of bits. This string of bits is split up into 8 bit long data code words. Then, the choice of error correction level is performed and the error correction code words using the Reed-Solomon code are generated. After that, the data and error correction code words are arranged in the correct order. In order to be sure that the generated QR code can be read correctly, the best (for encoded data) mask pattern is applied. After this manipulation, the code words are placed in a matrix in a zigzag pattern, starting from the bottom-right corner. The final step is to add the function patterns (position tags, alignment, timing, format and version patterns) into the QR code. The private row-bit string is encoded using error correction code (ECC) to ensure the message error correction after the PS

operation. We use the block codes, and more precisely cyclic codes (or polynomial-generated codes) such as Golay code or Reed-Solomon code, for message encoding. Cyclic codes can be defined in matrix form and polynomial form. The private message is embedded in textured patterns. These textured patterns are taken from the pattern database. For private message sharing and in document authentication black modules are replaced by using textured patterns. For image sharing in private level, image is converted to byte array then it is encoded using Base64 string encoding scheme. The pattern recognition method that we use to read the second level information can be used in both private message, image sharing and authentication scenario. It is based on maximizing the correlation values between PS degraded patterns and reference patterns.

CONCLUSION

The proposed 2LQR code increases the storage capacity of the classical QR code due to its supplementary reading level. Experimental results show that the storage capacity is improved. 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. The suggested textured patterns can be distinguished only after one P&S process. Therefore, we can use the detection method with original patterns in order to ensure good document authentication results.

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