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A Survey on "Two-Level QR Code for Document Authentication"

Madhuri Mohanrao Jagtap , Prof. S. K. Bhatia

Department of Electronics & Telecommunication, Imperial College of Engineering & Research, Wagholi, Pune, India

ABSTRACT: QR code authentication two level storage is used, which help to authenticate original information in QR code. Our proposed work uses 2 level QR codefirst is public and second is private storage level of document storage. In the public level is same as standard QR code storage level which can be read by any QR code readable device. The private level is constructed by replacing the blackmodules by specific textured patterns. It consists of information encoded using q-ary code with an error correction capacity. This allows us not only to increase the storage capacity of the QR code, but also to distinguish the original document from a copy. This authentication is due to the sensitivity of the used patterns to the print-and-scan (P&S) process. The pattern recognition method that we use to read the second-level information can be used both in a private message sharing and in an authentication scenario. It is based on maximizing the correlation values between P&S degraded patterns and reference patterns. The storage capacity can be significantly improved by increasing the code alphabet q or by increasing the textured pattern size. The experimental results show a perfect restoration of private information. It also highlights the possibility of using this new rich QR code for document authentication.

KEYWORDS: QR code, two storage levels, private message, document authentication, pattern recognition, print-and-scan process.

I. INTRODUCTION

The use of QR codes is increased because they are robust to the copying process, easy to read by any device and any user, they have a high encoding capacity enhanced by error correction facilities, they have a small size and are robust to geometrical distortions. However, those undeniable advantages also have their counterparts:
1) Information encoded in a QR code is accessible to every user easily, even if it is encoded.
2) It is difficult to classify original content from duplicate file content due to print and scan feature.
3) 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.

A. QR Code Features

The QR code was invented for the Japanese automotive industry by Denso Wave1 corporation in 1994. The most important characteristics of this code are small printout size and high speed reading process. The 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 is used for data encryption. Therefore, one of 4 error correction levels has to be chosen during QR code generation. The lowest level can restore nearly 7% of damaged information, the highest level can restore nearly 30%.Today, 40 QR code versions are available with different storage capacities. The smallest QR code version (version V1) has a 21 × 21 module size. It can store 152 bits of raw data at the lowest correction level. The biggest QR code version (version V40) has a 177 × 177 module size. It can store a maximum of 7089 bits of raw data at its lowest correction level.As illustrated in Fig. 1, the QR code has a specific structurefor geometrical correction and high speed decoding.

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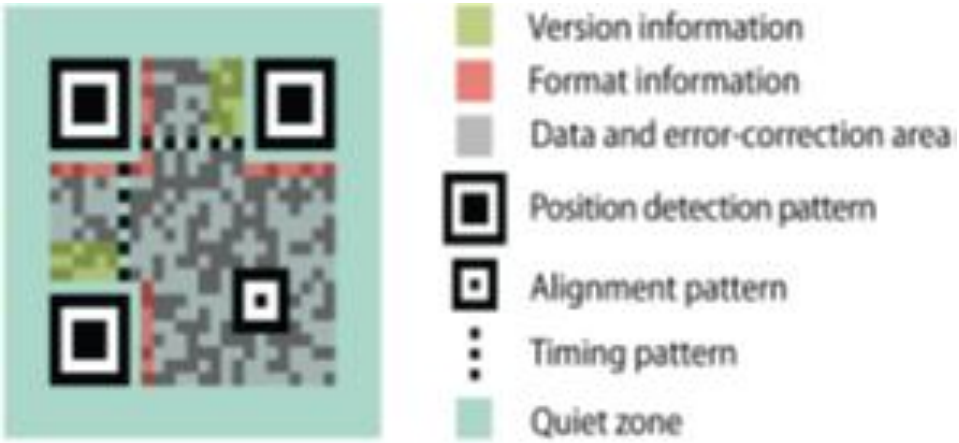

Fig. 1. Specific QR code structure

Three position tags are used for QR code detection and orientation correction. One or more alignment patterns are used to code deformation adjustment. The module coordinates are set by timing patterns. Furthermore, the format information areas contain error correction level and mask pattern. The code version and error correction bits are stored in the version information areas.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 which QR code. The QR code recognition algorithm includes thescanning process, image binarization, geometrical correctionand decoding algorithm

II. EXISTING SYSTEM

Existing framework in view of seeking social values between P&S process which is unhelpful examples and related examples. The capacity limit can be eminently expanded by code letters in order q or by expanding the finished example measure. Existing framework comes about demonstrate reclamation of private data. It likewise highlights the likelihood of utilizing this QR code for record verification. In this work private level developed by supplanting dark modules by particular surface example. For this currentwork utilizes rich graphical code. Private message are embedded by including distortion in print and scan technique. These rich graphical codes increment hugeness by enhancing tasteful perspective of QR code.

Advantage:-

Increase storage capacity of QR code along with differentiate original document.

Disadvantage:-

1) Data stored in a QR code is can be easily readable
2) Data is not plain text and therefore is only readable to authorized user,likewise watch and read.
3) It is impossible to classify an originally document in QR code from its copy due to their insensitivity to the Print and Scan process.
4) Insensitive to copy process.
5) Normal QR code does not have the authentication.

III. LITERATURE SURVEY

Many experts present these views about graphical codes in order to improve the graphical code properties, several rich graphical codes have recently been introduced. These rich graphical codes aim to add visual significance, to personalize the stored information or to increase the storage capacities.

J. Rouillard, “Contextual QR codes,” [1] Author studied and proposed under the name of contextual QR code. It relates to the static QR code information with a particular context. The authors developed a specific application, which takes

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into account the individual users parameters (time, device type, IP address, location) in order to personalize (add the name of a user, change the language) an output message and to transmit user information into a server database.
M. Querini and G. F. Italiano, "Facial biometrics for 2D barcodes," [2] Author proposed Two D barcode and the most popular enrichment is the stored capacity improvement. The HCC2D code is a rich QR code which significantly increases the storage capacity of the standard QR code. The authors increased the density and storage capacity of standard QR code by replacing binary colored modules by RGB colored modules. The HCC2D code encodes information using 4, 8 or 16 module colors. This code inherits all the strong properties of standard QR codes, but it is not readable by a standard QR code reading application and needs to be printed using a color printer.
T. V. Bui, N. K. Vu, T. T. P. Nguyen, I. Echizen, and T. D. Nguyen, "Robust message hiding for QR code" [3] the QR code steganography, which aims to hide secret message into a QR code, was introduced. the authors suggest to insert the secret message by using the error correction capacity of the QR code. That means, they changed the bits encoded in the standard QR code, and inserted errors into it. In this case, the secret message does not disturb the reading process of the QR code message, but the error capacity of QR code is low. The maximum secret message length, mentioned in this paper, is equal to 1215 bytes for QR code V40. There are also some approaches that embed an invisible watermark into the QR code image.

R. Villán, S. Voloshynovskiy, O. Koval, F. Deguillaume, and T. Pun, "Tamper-proofing of electronic and printed text documents via robust hashing and data-hiding," [4] proposed interesting rich graphical codes. The multilevel 2D barcode significantly improves the storage capacity of 2D code. The authors proposed to use one halftone cell to represent one multilevel 2D symbol. Only the black-and-white (B&W) halftone printers and low resolution CDD-based scanners (up to 600 dpi) were used for their experiments. It was discovered that the rate of encoded version of multilevel 2D barcode is approximately 261 byte/cm2 at a bit error rate of $4 \times 10{-}2$ in comparison with the rate of DataMatrix, which approximately equals to 58 byte/cm2.

T. Langlotz and O. Bimber, "Unsynchronized 4D barcodes," [5] proposed and studied The rich DataMatrix code, named unsynchronized 4D barcode, increases the storage capacity by using RGB colors of modules and time. It consists of the 9 coloredDataMatrix codes displayed in sequence on the screen. The particular color reference surrounds the DataMatrix and changes for each of 9 dataMatrix codes. This code has good storage capacity improvements, but it cannot be printed. The storage capacity is a transmission capacity and achieves 1400 characters per minute (23 characters per second) the success rate equals to 82%. This code is not readable by standard DataMatrix reading application.

J. Picard, "Digital authentication with copy-detection patterns," [6] proposed The graphical code used is the copy detection pattern 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. If the difference among these images is less than threshold λ, then this graphical code and document are authentic.

IV. PROPOSEDSYSTEM

Proposed QR code with a public level and a private level is used for private data sharing and document authentication. Two application scenarios for 2LQR code can be suggested: a private message sharing scenario and an authentication scenario. The main purpose of aprivate message sharing scenario **is** the invisible storage and transmission of private information into QR code. In a printed document authentication scenario, we aim to verify whether the printed document is an original or a copy. Only the original document (printed by authorities) is considered as an authentic.

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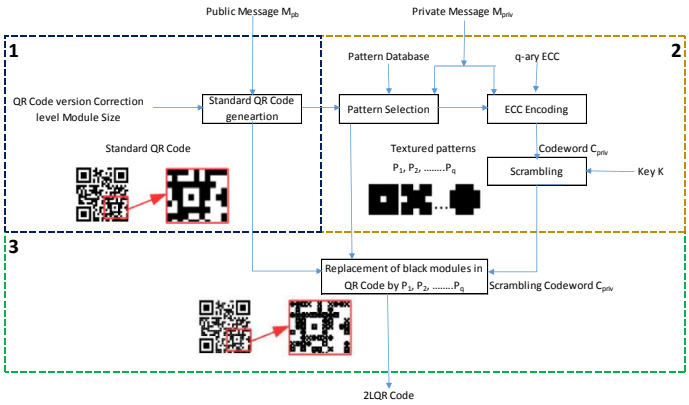

Fig 2: block diagram of proposed system

The private level is created by replacing black modules with specific textured patterns One important feature of the textured patterns used is their sensitivity to the P&S process. 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.

V. CONCLUSION

In this project 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. 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.we can use the detection method with original patterns in order to ensure good document authentication results.

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