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Enhanced Protection on 2D Barcode Using Image's Embedding PiCode Approach

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Abstract:

2D barcodes have been widely used as an interface to connect potential customers and advertisement contents. However, the appearance of a conventional 2D barcode pattern is often too obtrusive for integrating into an aesthetically designed advertisement. Besides, no human readable information is provided before the barcode is successfully decoded. This paper proposes a new picture-embedding 2D barcode, called Code, which mitigates these two limitations by equipping a scan able 2D barcode with a picturesque appearance. A barcode (also bar code) is an optical, machine-readable, representation of data; the data usually describes something about the object that carries the barcode. Traditional barcodes systematically represent data by varying the widths and spacing of parallel lines, and may be referred to as linear or one-dimensional (1D). Later, two-dimensional (2D) variants were developed, using rectangles, dots, hexagons and other geometric patterns, called matrix codes or 2D barcodes, although they do not use bars as such. Initially, barcodes were only scanned by special optical scanners called barcode readers. Later application software became available for devices that could read images, such as smart phones with cameras. Code is designed with careful considerations on both the perceptual quality of the embedded image and the decoding robustness of the encoded message. Comparisons with existing beautified 2D barcodes show that Code achieves one of the best perceptual quality for the embedded image, and maintains a better trade-off between image quality and decoding robustness in various application conditions. It's practicality for real-world applications have been successfully demonstrated.

Keywords — **2D barcode, linear, one-dimensional, rectangle, Code.**

I. INTRODUCTION

Two-dimensional (2D) barcodes are widely used in the advertisement business as a bridge to link the offline and online contents. In such a application, a 2D barcode encoding a product promotion web link is often attached to an advertisement to engage customers and the mobile phone with ever increasing computational power and imaging capability is employed as a 2D barcode capturing and decoding device [3]. Potential customers can conveniently retrieve further information about an advertisement by scanning the barcode with their mobile phones. This process simply involves initiating suitable barcode scanning mobile software and pointing the phone camera towards the barcode. More human oriented applications of 2D barcodes can be founded. However, the traditional 2D barcodes, such as QR code and Data Matrix code are not originally designed for mobile barcode applications.

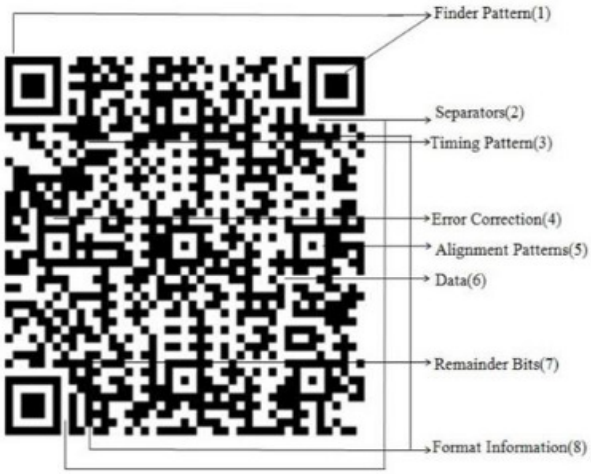

Fig. 1 QR Code Structure

Firstly, they are of binary appearance which is not perceptually attractive and are too obtrusive to be integrated with colourful and aesthetic

advertisement contents. Secondly, no visual hint about the encoded information content is provided before a successful decoding is accomplished. These two issues limit the potential customer's interest in scanning the barcode and reduce the chance of successful customer engagement. A recent report shows that the scanning volume of a picture-embedding QR code is three times more than that of the traditional QR code.

II. EXISTING SYSTEM

Potential customers can conveniently retrieve further information about an advertisement by scanning the barcode with their mobile phones. This process simply involves initiating suitable barcode scanning mobile software and pointing the phone camera towards the barcode. More human oriented applications of 2D barcodes can be found in software.

The 2D Barcodes2D barcodes improve the working of single dimensional barcode by providing better data rate. Here the data is encoded in both height and width of barcode. Almost30 different types of barcodes are known. Of these some are commonly used like data matrix code, Shot code, Visual code etc. The 2D barcodes can be widely divided into two categories: Index-based barcodes and Database 2D Barcodes. The type index-based 2D barcodes take into account the reading limitations of these built-in cameras. The illustration Code, Shot Code, belonging to this have a much lower data capacity than database 2D barcodes, but they offer robust and reliable barcode reading. The database 2D bar-codes—QR Code, VS Code, and Data Matrix—were initially invented to improve data capacity for industrial applications. However, when integrated into mobile phones with built-in cameras that can scan and decode data, these 2D barcodes can operate as portable databases, letting users access information anytime, anywhere, regardless of network connectivity. Now let us move to important and popular 2D barcodes-QR codes. QR Codes QR-Quick Response codes are one among the most powerful 2D barcodes. Although it was initially developed for ship tracking by Denso-Wave company, now they are widely useful in most of applications like product tracking, person identification, online url's etc. This was made possible by the features of QR code like readable from 3600, linking functionality, masking, data restoration functionality, small size, high speed reading etc. The code could handle Japanese and Chinese characters as well. Going t o the structure of QR codes the standard QR code consists of a Function region, Data Region and a Quiet Zone that separates QR code from other regions. QR codes adopt an arrangement of black and white squares for all the required functions. In particular, each module represents a single bit following a simple rule: black squares store 0 and white squares store

QR code detection technology has been studied in past days. We can simply split the recognition into two steps, image pre processing and QR code extraction .In image pre processing, some researchers focus on image de noising or camera shivering. In order to improve the performance of low resolution QR-code detection, previous work uses the super-resolution technique that generates a high pledge image from multiple low-resolution images. Moreover, some researchers use different finalizations to improve the non uni form background and un even light problems .In QR code extraction, researchers propose several different methods to locate and extract the QR code of images. Some researchers use the feature of finder pattern to find rough QR code position. After estimating the QR code's four corners using the rough QR code position, they effectively extract the QR code of images. In research they use edge detection of in possible rough barcode area. Then, morphological dilation and closing are used to generate more compact regions. Finally, the position of QR code of images can be detected. Although these researches have their contributions, there are some shortcomings we can improve. Researchers only focus on image denoting, but locating QR code positions an important part of QR decoding. They did not propose their method to process this problem. Previous works need enormous calculation. Their methods are difficult to decode QR code image in real time. In their binarizaiton method needs to know the version of QR code in advance. In this paper, we propose a

decoding method to improve the deficiencies in previous work.

A. DISADVANTAGES

- Binary appearance which is not perceptually attractive
- No visual hint about the encoded information content is provided before a successful decoding is accomplished.

III. PROPOSED SYSTEM

A novel picturesque 2D barcode, named the PiCode. Comparing with existing beautified QR codes, it provides one of the best perceptual quality in preserving the aesthetic appearance of the embedded image, while maintains the decoding robustness. It is achieved by the design of barcode pattern and better decoding algorithms. The PiCode is designed with less obtrusive fixed patterns to avoid distortions on the embedded image, and a modulation scheme which represents the data bit value adaptively with the embedded image intensity.

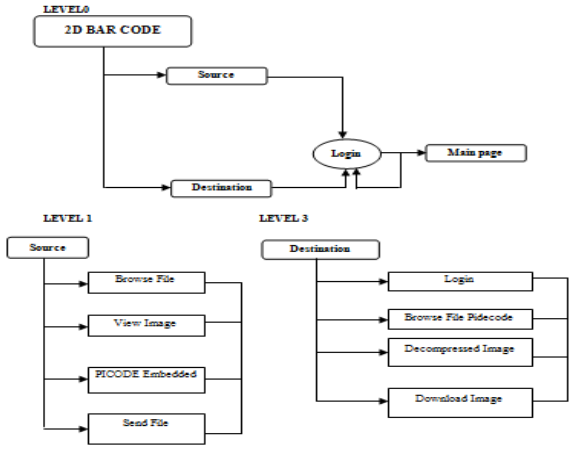

Fig. 2 Flow of the project

B. ADVANTAGES

- Best perceptual quality in preserving the aesthetic appearance of the embedded image
- Fixed patterns to avoid distortions on the embedded image
- The embedded image intensity
- It is easy and simple.
- Enable Pictures integrated with 2D barcode with Better Visual Appearance.
- Clear Appearance.
- To improve the efficiency and robustness of the encoded message.
- Provide a Clear Motivation to scan a barcode**.**

IV. MODULES DESCRIPTION

C. Login

This module is the first module. From this page only the user can navigate to project. Only the authorized person can enter by giving valid information. If the user provides the invalid information then permission denied navigating to other pages. This authentication module concentrates the security of the project from the unauthorized users.

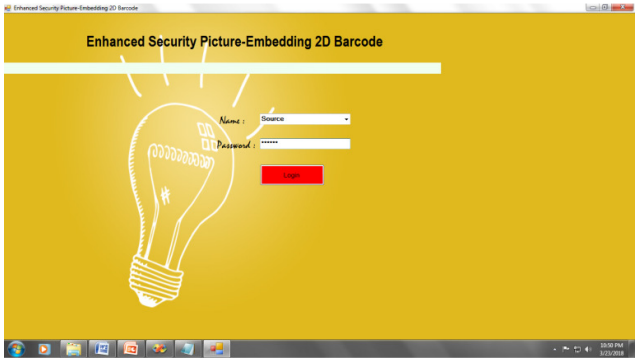

Fig.3 Login module

D. Picode Encoding

Picode Encoding Process which consists of four main parts. Block division, source & channel coding, Modulation, & last is finder pattern generation. The whole process of Picode encoding is described as follows. The input message is selected it may be word or digits etc. Then the input image is selected such that the input message can be encoded in image. Once the message is selected the Source coding and channel coding is applied on that message. After the source & channel coding we get two outputs i.e. message length & bit stream (0, 1, 0, 1 ...) of that message. Then the input image is divided into no. of blocks according to the length of that message. After that the adaptive modulation scheme can be applied according to image blocks & bit stream of the input message. Then the Picode modules can be generated. Finder pattern of Picode modules can be generated.

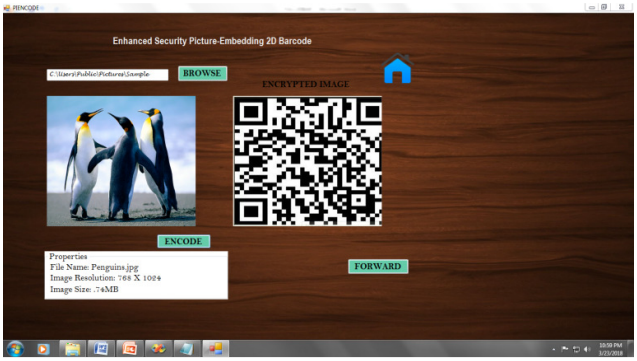

Fig.4.Picode Encoding

E. Picode Decoding

Picode Decoding Process which consists of seven main parts. i.e. RGB to greyscale, Binarization, Corner detection, perspective transform, module alignment, Demodulation, Source & channel coding etc. The whole Picode decoding Process can be described as follows. Take an input image as picode image. Convert that RGB image into greyscale image. After that Binarization of greyscale image can be done. The output comes as Potential barcode regions. Then the corner Detection algorithm can be applied on binarized image. Then we get the barcode location of image. After the perspective transformation Module alignment of squarish barcode can be done. Then we will get the picode modules. Once the demodulation is applied on those picode modules we get the bit stream of our original message. Finally by applying the source & channel coding on bit stream get the original message.

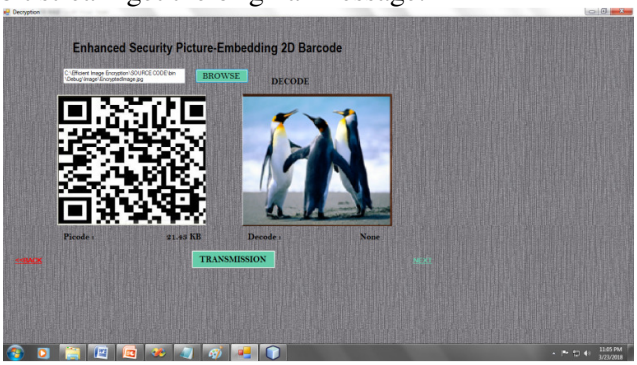

Fig.5. Picode decoding

F. Picode at a Glance

A two-stage 2DBAR code beautifier proposed using module based binary image and pixel-based binary image which is used to ensure visual semantics of the embedded content and decodability. To improve visual quality rendering mechanism is used which takes original image and pixel based binary image .An optimization based approach used to embed color images into 2DBAR codes. To avoid the visual distortion of the 2D image, the algorithm utilizes half toning techniques based on halftone mask . This paper presents how the saliency of the embedding image is considered in 2D code beautification by considering some perceptual features. Simulated annealing (SA) optimization is chosen, to achieve the goal of generating visual pleasant 2Dcodes.

G. SVM

A Support Vector Machine (SVM) performs classification by finding the hyper plane that maximizes the margin between the two classes. The vectors (cases) that define the hyper plane are the support vectors. In machine learning, support vector machines SVMs, also support vector networks) are supervised learning models with associated learning algorithms that analyze data used for classification and regression analysis.

V. CONCLUSIONS

Bar code System is a new type of 2D barcode & it is very efficient technique in today's world. It is the extension part of the existing beautified QR code. In today world for all applications this system can be used as much easily than the existing one. It provides the best perceptual quality in preserving aesthetic appearance of the embedded image & also maintains the decoding robustness. One important thing is that while decoding of code the coarse fine corner detection & module alignment algorithm can be used so that we get the information from all pixels in each module i.e. block. From above result it shows that the code shows the better trade-off between the perceptual quality & decoding robustness as compared to existing beautified QR code.

This project can be further enhanced by designing the barcode scanner for scanning the code (picture embedded 2d barcodes).QR code scanner

only recognize the structure of QR code which contain the squarish pattern to scan the information. The squarish pattern is present at the three corners of the QR codes. code contain the QR code inside the image so we have to design the scanner in such a way that it can recognize the code (picture embedded 2d barcode) structure and decode the information successfully.

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