Commonly the characters, numbers etc are embedding in QR codes. This paper introduces the concept of color image embeddings in QR codes. This is an automatic method to embed QR codes into color images with bounded probability of detection error. These embeddings are compatible with standard decoding applications and can be applied to any color image with full area coverage. To mitigate the visual distortion of the QR image, the algorithm utilizes halftoning masks for the selection of modified pixels and nonlinear programming techniques to locally optimize luminance levels. Take one color image and converted into gray image. Then this doing the masking process, window extraction, image embedding, decoding like processes. After this process the original gray image is taken from this.

Keywords: Error Correction Code Words, Finder Pattern, Halftoning, Masking, Window Extraction

I. INTRODUCTION

QR code (Quick Response code), a kind of two-dimensional barcode investigated by Denso Wave, is currently used in Japan. It is used to get a URL, e-mail address, phone number and so on. Most Japanese mobile phones have cameras and QR code scanner. Although QR code can involve various information such as URL, e-mail address, short sound, and so on, users cannot know what kind of information is implanted in it (from QR code itself). This paper proposes a system for generating two-dimensional barcode incorporated with some illustrations inside the code without affecting machine-readability and stored information. It formulate the task of finding appropriate position, scale, and angle of an illustration, photo, logo or other image item put into QR code as an optimization problem. By using evolutionary computation algorithm, the proposed system can find positions in which a given image item can be merged without damaging machine-readability and stored information. A user can also generate and print their own QR code. There are 40 different versions of the QR code, each higher version containing 4 modules (a module is the smallest black or white square) more on a side than the next lower one and hence being capable of carrying more in-formation; with version 1 having 21 modules on a side. The code is easily decoded using image analysis techniques.

QR codes can be read from any direction of 360 degrees and tilt and size of the symbol position detection pattern. A position detection pattern is detected so that the ratio 1:1:3:1:1 alternately light and dark, QR codes are decoded by detecting these three patterns in the symbol edge. Thus, to detect a similar pattern of data encoding and error correction code portion, so that false position detection pattern, a mask pattern is selected from eight pattern. The random appearance of QR codes is not visually appealing, and significantly distracts from the overall production quality of the advertisements in which they appear.

II. RELATED WORKS

Satoshi Ono et al. [2] proposed evolutionary computation algorithm, it can find positions in which a given image item can be merged without damaging machine-readability and stored information. The proposed system can also incorporate more than one image into a QR code. Zachi Baharav et al. [3] proposed Colored QR codes for the purpose of increasing data rate; although color has the potential to improve appearance and significance; those aspects have not been explored. Toshihiko Wakahara et al. [4] If QR code is encoded, a symbol of the smallest version that can accommodate the data to be encoded is usually selected. When the version is increased, amount of data and capacity also increase and the redundancy increases. QR (Quick Response) codes are frequently used with progress of the Internet and introducing the QR decoding function in the cellular phone. A bar code shows an individual identification number (ID) by this number fundamentally. Damri et al. [10] the symbol version of QR code is defined in the range from 1 to 40 corresponding to the size of the encoded information. Each version has a different module configuration or number of modules. Normally a bar code region contains special texture information than its background, there had been many approaches using texture analysis to locate the bar code area Considering the use case that the
bar code region always occupies a large area in the bar code image taken by a camera phone and the background is not complex, it simply use Hough transform to locate the four corners of the bar code region, and it is easy to compute the size of the bar code based on the periodic edge information after it has been located [7].

III. PROPOSED APPROACH

Figure 1 shows an example of QR code symbol. The figure is version 1 (type 2) and the module is 21 X 21 cells, vertical 21 cells and horizontal 21 cells. This version is specified from 1 to 40, increased by 4 cells per one version up. The maximum version is 40 and the size is 177 X 177 modules.

Figure 1 is a case of the QR code version 1 modules that are arranged in a grid pattern of black and white squares. In this QR code symbol, there are three position detection patterns (Finder patterns) in the upper left corner, bottom left and top right corner. Then the timing pattern is placed between every one of these position detection patterns. There are four modes available, (1) number mode, (2) alphanumeric mode, (3) 8 bit byte mode and (4) kanji and kana characters mode. Up to 7,089 characters can be encoded in one symbol. QR code has error correction capability. The RS (Reed Solomon) error correction code is used for recovering from symbol dirty or transmission error. There are four levels of error correction capability, Level L: about 7 percent recovery, Level M: about 15% error recovery, Level Q: about 20% error recovery and Level H about 30 percent recovery [4].

A. Function Pattern Region:

Finder and alignment structures are essential to locate, rotate and align the QR code. The former ones are designed to have the same ratio of black and white pixels when intersected by a line at any angle, allowing to easily detecting rotated or inverted codes. Alignment patterns are used to determine the sampling grids from which codewords are extracted and they are easily identifiable as concentric square structures evenly distributed along the code area.

B. Encoding Region:

The code area delimited by finder patterns is denoted as the encoding region, where data, parity modules and decoding information is stored. This area is divided into codewords consisting of blocks of 8 QR modules. Two dimensional shapes of these codewords depend on the version of the code and are designed to optimize area coverage.

C. Data Capacity and Error Correction:

Different types of QR codes defined in the standards are identified by their version and error correction level. The version of the QR code determines its size and goes from 21x21 modules for version 1 up to 177 x 177 for version 40. QR codes use Reed Solomon code for error correction and there are 4 types of error correction L, M, Q and H that allow to correct up to 7%, 15%, 20% and 30% of codewords in error respectively. Maximum numbers of coding characters in each mode are as follows.

1) Error correcting in QR Code:

QR Code is the Error Correcting for reading the data to move between the black and white. This classification is in the Error correcting into four levels. Error correcting able to restore data even the QR code contain damage such as scratch. The portion of
damage calculate in term of percentage ratio to the area of the QR code must under the error correcting level in order to restore data. However, that damage must not infect to certain area which is finding Pattern or Format Area as it contain essential information regard to decoding process. The decoding processes halt, if the Finding Pattern or Format Area is damage.

The three stages involved in QR code blending and sensing are shown. The blending stage combines the color image C and the QR code image Q based on the luminance of C and the binary value of Q. Transmission and scanning introduce noise, which is modeled as N added to B. Decoding compares the received code pixel R to a threshold, and outputs a binary image O. The simple method of decoding allows for some latitude in QR code design. If it treat luminance values as normalized to the interval, then sensed values in the range are considered white by the decoder, and those in the interval are considered black. Therefore, it may in theory modify the QR code source pixels so that pixels in a white module are transformed from white to any RGB coordinate whose luminance value exceeds, without creating a decoding error; similarly, it can modify black modules of the QR source so that their luminance falls below. In practice, the luminance sensed by the camera fluctuates due to lighting conditions and noise. Therefore, it is prudent to use upper and lower modification thresholds denoted, respectively, so that white pixels are modified to have luminance black pixels to have luminance. The differences the latitude in decoding allows blending of a color image C into a QR code, denoted Q, without incurring a decoding error it present in this paper a novel method of blending a color image into the QR code, which in the noise-free case entails no loss of error resilience.

IV. EXPERIMENTAL RESULTS

Color image is embedded in QR code, RGB color combination embedding is doing. Red and green combination, red and blue combination, green and blue combinations are making. The color image is converting into gray and four corners are masking. Then window extraction is doing. Then hidden image is extracted from this. The embedding of image pixels introduces changes in the luminance of the code, distorting the binarization thresholds and thus increasing the probability of detection error. The second challenge concerns the problem of using the entire area of the code in which the image or logo is to be embedded. This cannot be achieved by simply replacing information modules with the desired image since the number of modules that can be replaced is at most proportional to the correction capacity of the code. A good embedding method should minimize the number of corrupted modules and use the greatest possible area while keeping visual fidelity to the original image. This paper aims at the above cited goals by introducing QR images, an optimization based approach for embedding color images into QR codes. The algorithm proposed is based on the selection of a set of modified pixels using a halftoning mask. The concentration of pixels and its corresponding luminance are optimized to minimize a visual distortion metric subject to a constraint in the probability of error. This algorithm can be applied to any color image and QR code with full area coverage and bounded probability of error. A novel contribution of this paper is the use of halftone masks to distribute the modified pixels and the introduction of a probabilistic mode 1 to predict the distortion generated by the embedded image. This allows controlling the trade off between image qualities and decoding robustness by setting a few parameters such as the number of modified pixels at the center of each QR module and the maximum allowed probability of error.

Fig. 3: Color image embedding, masking and window extraction.
The code does not visually identify the vendor, and therefore reduces distinctiveness of the product. The QR codes were scaled up from 45 x45 to 1450x1450 pixels. The method presented here defines a quality metric which considers color, tone and structural similarity used to select the optimal luminance of modified pixels. The original colour image is embedded in QR code; masking process is done with the help of halftoning mechanism and also does window extraction. This paper proposes the QR code embedding methods.

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