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International Journal of Advance Research in Education, Technology & Management

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A Review Paper on Recognition of 2D Bar Codes

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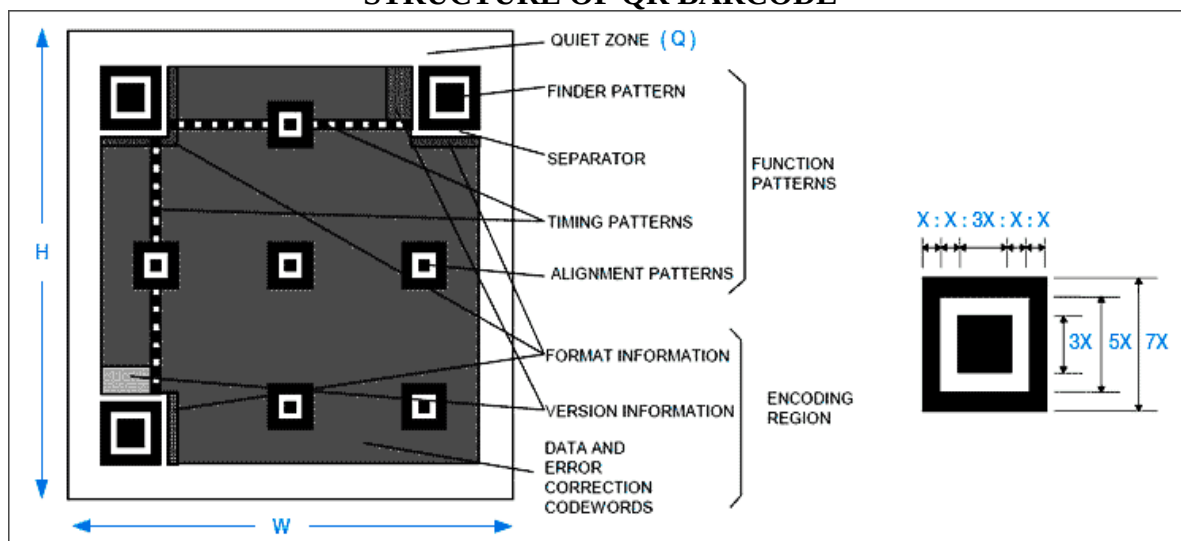
Abstract-

The popular combination of cameras and mobile phones ,will naturally bring great commercial value to use the camera phone for 2D bar code reading. We propose an efficient scheme for 2D bar codes decoding, of which the effort is put on solutions of the difficulties introduced by low image quality that is very common in bar code images taken by a phone camera. , we introduce a hybrid Fourier-Radon transform to estimate the parameters of the blurring kernel with improved robustness to noise over available techniques. The experiments on both simulated images and real images show that our algorithm is capable of accurately identifying the blurring kernel for a wider range of motion types. A novel post-localization process based on edge tracing is also proposed to further validate the initially localized corners. Data Matrix barcode is one of the most extensively used 2D barcodes. There is an innovative method for Data Matrix barcode localization based on boundary tracking and Radon transform was proposed. In current paper we will discuss about the blurriness, localization and geometry correction of the 2D bar codes.

INTRODUCTION

QR code is a short stand for quick response code as the creator intended the code to allow its contents to be decoded at high speed. QR Code is a two-dimensional symbol. It was invented in 1994 by Denso, one of major Toyota group companies, and approved as an ISO international standard (ISO/IEC18004) in June 2000. This two-dimensional symbol was initially intended for use in production control of automotive parts, but it has become widespread in other fields. Now QR Code is seen and used everyday everywhere. The primary objective was to create a "code read easily by the scanner equipment". The QR Code is an information matrix that carries meaningful in the vertical direction as nicely as the horizontal, hence the two-dimensional term. By carrying in each direction, QR Codes can carry up to several hundred times the amount of information carried by 1dimensional bar codes.

STRUCTURE OF QR BARCODE-





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a) FINDER PATTERN

It is a pattern for detecting the position of the QR Code. By arranging this pattern at the three corners of a symbol, the position, the size, and the angle of the symbol can be detected. This finder pattern consists of a structure which can be detected in all directions (360°).

b) ALIGNMENT PATTERN

The Alignment Patterns are positioned symmetrically on either side of the diagonal running from the top left corner of the symbol to the bottom right corner. They are spaced as evenly as possible between the Timing Pattern and the opposite side of the symbol, any uneven spacing being accommodated between the Timing Pattern and the first Alignment Pattern in the symbol interior. It is a Pattern for correcting the distortion of the QR Code. It is highly effective for correcting nonlinear distortions. The central coordinate of the alignment pattern will be identified to correct the distortion of the symbol. For this purpose, a black isolated cell is placed in the alignment pattern to make it easier to detect the central coordinate of the alignment pattern. For example, in a Version 7 symbol the table indicates values 6, 22 and 38. The Alignment Patterns, therefore, are to be centered on (row, column) positions (6,22), (22,6), (22,22), (22,38), (38,22), (38,38). Note that the coordinates (6,6), (6,38), (38,6) are occupied by Position Detection Patterns and are not therefore used for Alignment Patterns.

c) TIMING PATTERN

It is a pattern for identifying the central coordinate of each cell in the QR Code with black and white patterns arranged alternately. It is used for correcting the central coordinate of the data cell when the symbol is distorted or when there is an error for the cell pitch. It is arranged in both vertical and horizontal directions.

d) QUIET ZONE

It is a margin space necessary for reading the QR Code. This quiet zone makes it easier to have the symbol detected from among the image read by the CCD sensor. Four or more cells are necessary for the quiet zone.

e) DATA AREA

The QR Code data will be stored (encoded) into the data area. The grey part in Figure represents the data area. The data will be encoded into the binary numbers of '0' and '1' based on the encoding rule. The binary numbers of '0' and '1' will be converted into black and white cells and then will be arranged. The data area will have Reed-Solomon codes incorporated for the stored data and the error correction functionality.

Features of QR BARCODE-

1. High Capacity Encoding of data
2. Small Printout Size
3. Dirt and Damage Resistant
4. Readable from any direction in 360°
5. Structure append feature QR

Applications of QR BARCODE-

- Business Cards
- Magazine / Newspaper Editorial Coverage
- Download Applications



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- Books
- Concert Venue
- Clothing Labels
- History Sites
- Online Banking
- Bus Schedules
- Food Products

Objectives:

The objective of my thesis is given below:

- Deblurring the blurred image.
- Detection of QR code throughout the image.
- Geometric correction of the QR barcode.

Problem formulation:

EXPERIMENTS STEPS AND MEASUREMENT

- The images captured are blurred due to motion between the image and the camera. Hence the image containing the QR barcode cannot be read by QR reader. To make the QR barcode readable the images are need to be deblurred. Wiener Deconvolution method is used to deblur the image.
- Blurred image is deblurred using the matlab program.

Research Methodology:

WIENER DECONVOLUTION, LUCY METHOD

- Deblurring with the Wiener Filter and Lucy Filter
- Use the deconvwnr function to deblur an image using the Wiener filter. Wiener deconvolution can be used effectively when the frequency characteristics of the image and additive noise are known, to at least some degree.

MOTION BLUR

- Motion blur: blur caused by relative motion between image and camera
- Linear motion blur: motion in one direction
- The goal is to identify the angle and length of the blur. Once the angle and length of the blur are determined, a point spread function can be constructed.
- This point spread function is then used in direct deconvolution methods to help restore the degraded image.



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Blurred

Deblurred



Geometry Correction:

- The geometry of the code has been distorted it is not possible to read the code as it is the requirement of the code reader that the image should be correct in geometry means the QR code should be a perfect square.
- Geometry of the square QR barcode is corrected using a MATLAB program.



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Conclusion:

The review of the literature is carried out helps in identification of some potential research issues pertaining to the areas where QR barcode has been used and also proved information regarding recognition of QR barcode with different algorithm with images captured in different conditions. It is observed that there are several approaches for accomplishing the above mentioned inspection task has been proposed by researchers in the existing literature.

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