An Online Barcode Generator

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What is barcode?

A barcode is a label-liked object which can store an amount of data in it. It is readable by optical machines to obtain the data. Originally barcodes systematically represented data by varying the width and spacing of parallel lines, and may be referred to as linear or one-dimensional. Due to the limitation of data capacity, two-dimensional barcode is developed to overcome the problem.

What is the usage of barcode?

Nowadays barcode is widely used in different fields, such as commercial, medical. For the commercial-use, the barcode can be used as price tag for items selling in retail shops. For the medical-use, the barcode can be used to indicate the patients by storing the personal information in the barcode.

What are the benefits of using barcode?

Barcode features a cheap cost to create with a good level of data capacity. It is also readable by many devices. And the most important thing is that, the data stored with the barcode can be easily updated. It is convenient for the operations in different fields.

What is 1D barcode?

One dimensional barcode (1D) is constructed by combination of vertical lines and spaces in different widths. It can record number and English only. Over several decades, many different types of 1D barcode have been developed, such as Code 39, EAN-8, EAN-13 and ISBN.
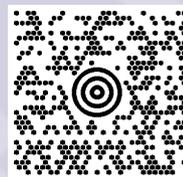
Code 93   UPC

What is 2D barcode?

Two dimensional barcode (2D) has been developed based on 1D barcode. 2D barcode is able to record Numbers, Alphanumeric, Kanji and binary information. Also, 2D barcode has error correction mechanism to increase its reliability.

Maxi code   QR code

Why we focus on QR code?

Nowadays the most popular type of 2D barcode would be QR code since it can be scanned by any cameras which are available to most of the people. QR code features a high capacity of data which is important to the user of it. Also, it has a wide usage that not just receives data from it but to run some extra applications. Therefore this project wants to promote a better generator of QR code.

Project Design

QR Code Structure

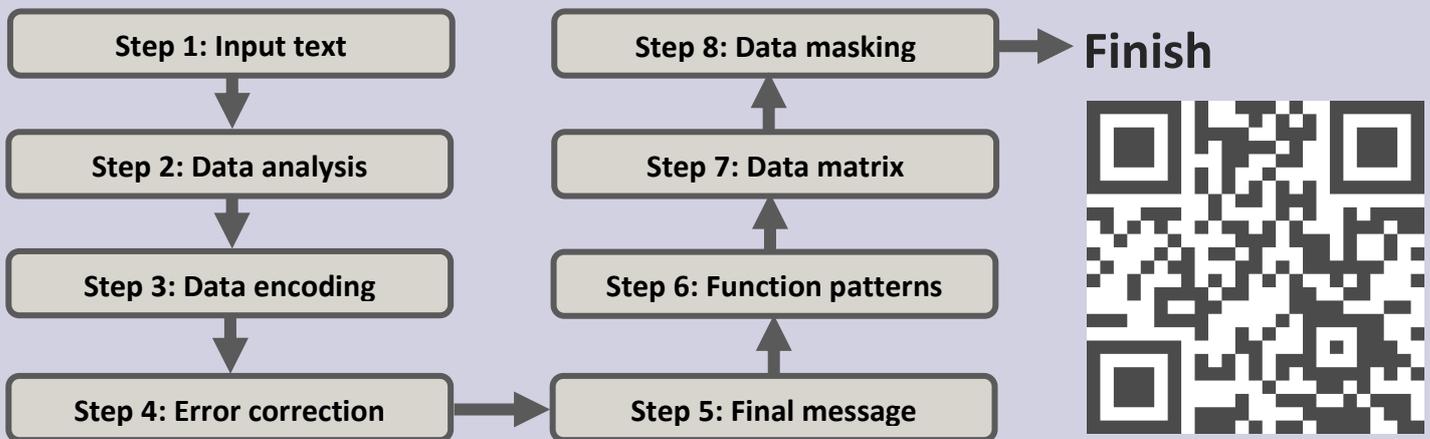A QR code structure includes two different parts – **Encoding Region** and **Function Patterns**.

Encoding region is used to contain data information and error correction data.

Function patterns is used to let QR code reader to read the QR code correctly.

- Finder
- Alignment
- Separators
- Timing Patterns
- Version Information
- Dark Module

QR Code Generation Steps

Step 1: Input text →
Step 2: Data analysis →
Step 3: Data encoding →
Step 4: Error correction →
Step 5: Final message →
Step 6: Function patterns →
Step 7: Data matrix →
Step 8: Data masking →
Finish

Data analysis & Data encoding

Data analysis is a step to analyze the mode of input text, such as Numeric, Alphanumeric. Different modes of text need to use different types of encoding method. Also, mode of text will determine which QR code version will be used.

Encode mode:
Numeric mode (only for digits 0-9)
Alphanumeric mode (digits 0-9 + uppercase letters)
Byte mode (characters from the ISO-8859-1 list)

QR code version:
From version 1 to version 40
Version 1 is the smallest version (21 x 21 pixels)
Version 40 is the largest version (177 x 177 pixels)
Each version increase 4 pixels

Calculate QR code size:
$$Size = (Version - 1) \times 4 + 21$$

Error correction

Error correction is used to ensure a QR code can be scanned by a QR code reader correctly. When a part of data codewords is damaged, error correction codewords can replace the damaged data. Error correction codewords can be generated by Reed-Solomon error correction.
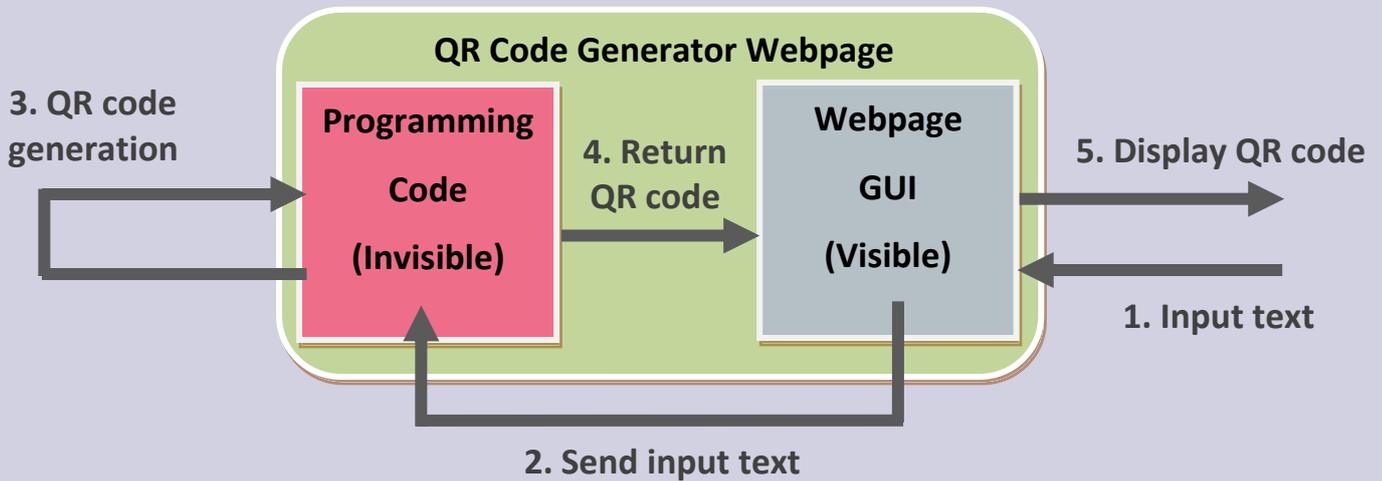
Error correction level:
Low, Medium, Quality, High

Reed-Solomon error correction:
Reed-Solomon error correction is a method to generate error correction codewords. It is a series of mathematics polynomial long division which include two polynomials - **Message Polynomial** and **Generator Polynomial**. Message polynomial is generated by input data codewords. Generator polynomial is generated by the number of error correction codewords. In fact, message polynomial will be divided by the generator polynomial.

Implementation

In order to demonstrate the QR code generator in different devices (e.g. Smartphone, Tablet, Computer) and different operating systems. The generator will be embedded in a webpage. Therefore, the generator can be used in various platforms. Also, the QR code generator will be developed by **JavaScript** since JavaScript can be executed in different browsers. In addition, the webpage interface is user friendly. Thus, users can generate a QR code easily.

QR Code Generator Webpage

3. QR code generation

Programming Code (Invisible)

4. Return QR code

Webpage GUI (Visible)

5. Display QR code

1. Input text

2. Send input text

Result

Finally, a QR code generator webpage is developed. This webpage interface is easy to use. Users only need to input the text which they want to convert a QR code, and click a "Generate" button. The generated QR code will be displayed in the right hand side. Compare with other QR code generator, this generator allows users to select the error correction level so that they can generate various QR code with different error correction level.

QR Code Generator

Error Correction Level : Level M
QR Code Color :
Input text :
HKUST CSE FYP Project 2013-14

Reset   Generate

QR Code

Save QR Code : JPEG PNG BMP

How to use | What is QR Code | Developer

Testing

In order to ensuring the generated QR code is encoded from input text, testing is needed. In addition, testing includes QR code scanning by other QR code reader. It can ensures that the generated QR code conforms the standard QR code structure. The right hand sides QR code images is generated by the QR code generator webpage.

QR code content: HKUST
Error correction level: M

QR code content: FYP Project
Error correction level: L