QR CODE BASED DIGITIZED MARKSHEET

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Abstract:

Today's world is the digital world and most of the data are stored in digital format. Therefore, it is necessary to optimize these data and preserve them in an eco-friendly manner. This paper presents a new method to digitize the academic transcript i.e. mark-sheets, and embed the digital format in the mark-sheet itself in the form of encrypted QR Code, so that the digital data can not be retrieved by any unauthorized user. In this way, we can save a lot of digital space, which is necessary to save those digital academic records of each student. In our new marksheet system, the digital data, which is embedded in the marksheet in form of encrypted QR Code, can only be retrieved and decrypted using our own web-application, which is hosted over network. Our new mark-sheet system introduces a new generation of digital academic transcripts which will be useful in universities.

Keywords: result; digitized mark-sheet; QR Code; encryption;

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I. INTRODUCTION

Today, because of ever growing digital data, it is very important to optimize these data and preserve them in an eco-friendly manner. In this paper, the author presents a new method to digitize the academic transcript [1] i.e. mark-sheets, and embed the digital format in the mark-sheet itself in the form of encrypted QR Code[11], so that the digital data cannot be retrieved by any unauthorized user. In this way, we can save a lot of digital space, which was necessary to save those digital academic records of each student. The student Mark sheet or Certificates will now be printed along with a QR Code print. The verifier will be having a application on his android device which will scan the QR Code on the digital certificates. The Android app will decode the QR Code and according connects to the website and retrieves the true/original copy of the certificate along the student photo registered with the certificate. On receiving the copy the verifier can easily detect the submitted copy is true or fake. QR Code   is a type of 2 dimensional matrix barcode, which gained popularity because of its large capacity to hold digital data and it can be integrated in any mobile devices. In our new mark-sheet system, we save the essential data of each student in the QR Code, like the student's name, roll number, registration number, semester and year of study, marks obtained in different subjects and grades secured. But, all the data saved and embedded in the QR Code, are encrypted, and then the QR Codes are printed in the mark-sheet of the student. So, in future if the student or any other person wants to see their marks digitally or wants to send their academic information to any University or Organization in digital format, then they can just scan the QR Code, decrypt the data and send the data. QR Code is a series of differently widthed and spaced lines that confers a numerical value to the item it is attached to. While it appears to be a 2D object, it's actually one dimensional, since the scanner picks up all the information it needs by taking a cross-section of the image.

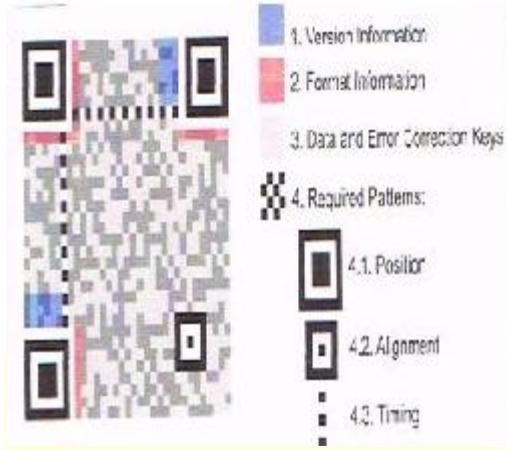QR, or "Quick Response," Codes are different in the layout of these codes,

Figure: 1 The three prominent boxes in the corners of each code indicate the location of the image (so it can be centered by the image parser). Another smaller box in the lower-right aligns the image. The rest of the blocks indicate the information specific to the international standards and finally the identifying data contained within the code.

II. SYSTEM DESIGN

A. System Architecture:

The College administrator updates the information on the server. This information carries the details of Students, their marks and academic certificates. Official and students on demand can download these digital certificates. The server when on demand patches the Encoded QR CODE on the digital certificate. This QR CODE contains the digital ID of the certificate and the data is encrypted and encoded in the QR CODE.
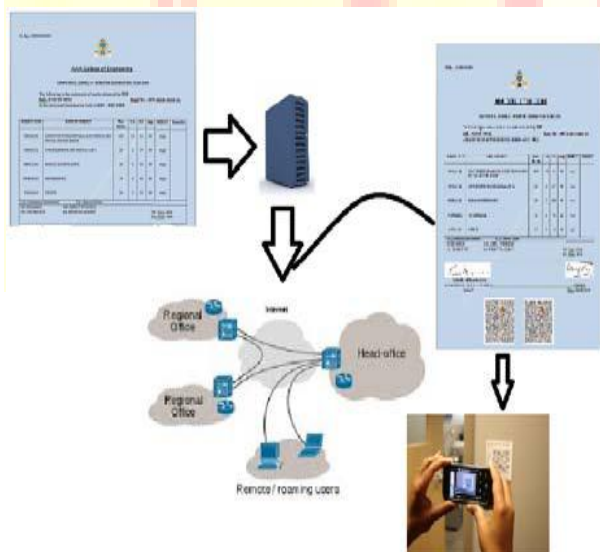
Figure: 2

certificate. The user needs to enter the authentication PIN which is given to him during the registration**.** This PIN is send to the Server along with the IMEI (International Mobile Equipment Identification) which the server authenticates the User and check whether the application is running on the same registered Mobile. On validating and if found a valid user the server provides an acknowledgement to the Mobile application which further activates the camera for scanning the QR Code. The user now shoots the QR CODE which is printed on the certificate. The mobile application then decodes the contents of the QR CODE and finds the Document Digital ID. This digital ID is further encrypted using the user PIN and is send to the server. The server then decodes the contents and send the all the required information to the user on him mobile application. The Mobile apps show the information that should be there on the certificate. The user can visually validate the contents and can determine the fake information on the certificate. This information help the user to find out the produced certificate is fake or not.

III. METHODS USED

The major of the system work is mainly focused on QR CODE.

To create a QR Code[11][3][4][5] we first create a string of data bits. This string includes the characters of the original message (encrypted message in this case) that you are encoding, as well as some information bits that will tell a QR decoder what type of QR Code it is. After generating the aforementioned string of bits, we use it to generate the error correction code words for the QR Code. QR Codes use Reed-Solomon Error Correction technique [10]. Please note that in coding theory, Reed Solomon codes (RS codes) are non-binary cyclic error correction codes invented by Irving S. Reed and Gustave Solomon. After the generation of bit-string and error correction code words, the resultant data is used to generate eight different QR Codes, each of which uses a different mask pattern. A mask pattern controls and changes the pixels to light or dark ones, according to a particular formula. The eight mask pattern formulas are defined in the QR Code specification, which is referred at the time of mask generation needed for the QR Code generation. Each of the eight QR Codes is then given a penalty score that is based on rules defined in the QR specification. The purpose of this step is to make sure that the QR Code doesn't contain patterns that might be difficult for a QR decoder to read, like large blocks of same-colored pixels, for example. After determining the best mask pattern, the QR Code, which

uses the best mask pattern, is generated and shown as an output. If the size of the encrypted message becomes more than 1,264 characters then the characters appearing after 1,264 characters are used separately to generate another QR Code and the above mentioned process is repeated until and unless the total encrypted message is converted to QR Code(s). The method is discussed in details below: The Encrypted file, which is created and is now treated as the input file and the string is extracted from the file to generate the QR Code.

Step 1: call function file_read(output_file)

Step 2: call function generateQR Code(str[])

Step 3: call function delete_file(output_file)

Architectural Point of view the mobile user scan the QR Code which is printed on the certificate. The user Mobile should be a registered mobile this means that no other QR CODE service will work on our system as the data is encoded and will be decoded only when the Mobile that is used to scan the QR CODE is registered and authenticated. The decoded data is the digital document and is send to the server for information retrieval. The server retrieves the information from the database for the unique Digital ID and the information is synchronized and is send to the user Mobile. The user can now easily detect the data he received and the information printed on the certificate.

IV. MOBILE PHONE QR CODE ENCODING AND DECODING SCHEME

A. Encoding and Decoding:

QR Code encoding and decoding[12][13] National standards GB/T 18284-2000 "Quick Response Code" is based and the minimum encoded version compatible with the data is selected.

B. QR Code collection and preprocessing:

Decoding data from a given code is the inverse process of encoding. Meanwhile, compared with images captured by special barcode reader, images acquired in natural environment have shadows and blurring defocus defects. If images are not of high quality, it is impossible to decode the code accurately or completely. Therefore, preprocess the image in the consideration of image problem caused by capture. Preprocessing of mobile phone QR Code follows the following steps: convert the colorful image to gray scale image, median filtering, binarization,

image location, rotation, perspective transformation and interpolation. Here conversion is done by weighted mean. After median filtering, bimodal image method is adopted to choose threshold for binarization. Then locate and rotate the image.

V. QR CODE PREPROCESSING SCHEME

A. Image Localization:

There are lots of methods to extract the edge of QR Code image[6][7][9][10]. Basic idea of edge extraction is to enhance local edge taking advantage of edge enhancement operator and extract edge points using preset threshold. To gain the rotation angle of QR image, horizontal part of Sobel operator is used to convolute with the image. Horizontal

edge image is gained using threshold. Edge detection result is shown in Figure 1 right. Adopt Hough transform to the horizontal edge image so as to calculate the rotation angle θ.

B. Rotation:

Set the center of QR Code image as reference. To begin with, the axis of center should be figured out. Since QR Code has position detection patterns located at the three corners of the symbol, search the whole image to find structures which resemble the position detection patterns. Calculate the average length of the QR image and determine the correct coordinates of the four corner. Detect the image edge using sobel operator, obtain the contour of the image and extract QR Code image from the original image removing irrelevant part[6][7][10]. We assume that the original QR Code's center is not altered. Then use the rotation angle θ obtained previously and rotate the image applying the universal equation :

[X/Y]=[cos θ   sin θ][x0/y0]

　　Sin θ cos θ

While x0 ,y0 are pixel coordinates of the original image, x1 ,y1 are corresponding pixel coordinates after rotation, and rotation angle θ is positive counterclockwise and negative clockwise.

C. Perspective transformation and interpolation:

If the plane which the camera lies in is parallel to the QR Code image, bilinear transformation can be adopted. However, real situation can be quite different from this assumption. When acquire QR Code image, the plane in which camera lies may not be parallel to QR image

[6][7][9][10] which result in foreshortening effect. Then perspective transformation can be adopted. Since output image pixels are usually mapped to input image in non-integer position, which is located between the four input pixels, interpolation should be applied to decide the pixel value. We can calculate the coefficient of bilinear transformation according to the original and corrected coordinates of the four corners. Then apply the bilinear transformation to the image to correct the image. We adopt the method which map the output image pixel to the input image and calculate the value using bilinear interpolation method. It is simple and easy to implement, meanwhile it avoid the situation in which pixels are mapped out of image boundary.

VI. SYSTEM IMPLEMENTATION

This system is to be implemented on the platform of Java SDK 7. The student information stored on the web is retrieved and printed in a digital form. The digital ID which is unique for every student in encode in QR Code and the QR Code image is printed in the digital certificate. After decoding the QR Code the system retrieves the Digital ID and the student information. This information is displayed on the Android Phone. This information needs to be cross checked visually.

VIII. REFERENCES

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