Authentication Login E-Library With Multimodal Biometrics System

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***Abstract*— Previous studies with the title of the login authentication e-library with method of CBIR for matching face, have proved reaching the level of accuracy about 75%. This multiple verification of QR-code/QR-CMBS this process data among other things the identity ID, fingerprint patterns and pattern signatures. Each user can have a QR-CMBS, which is used to login to the e-library. This research-oriented system development with application authentication login with QR code/QR-QR, Data of the CMBS will store data from bineri identity ID, fingerprint patterns and pattern signatures.**

The advantage of Retrieval CBIR is the popularity and test result with a high degree of accuracy and time parameters. The results obtained from QR-CMBS every training, i.e. classify and determine the value of fingerprint patterns and signatures for each label. Feature extraction results are temporarily stored in the session database and compare the features that are stored in the database image classification. The most similar classification results will be displayed, i.e. QR-CMBS, fingerprints and signatures, as well as verification of login. The application login authentication system of e-library uses to calculate the similarity of this research, will be able to extract the feature of colour, texture and edge of a multiple verification of QR-code/ QR-CMBS, fingerprint and signature by using the Prewitt gradient. The result of the extraction process feature is then used by the software in the learning process and calculates the similarity. Learning image contained in 3 classes features a picture that is stored in the database query 100 png images and the image of the sample test with the size 400 x 400. The results showed that the combination of the Prewitt filter extraction gradient magnitude. Verification data classification compared to the three classes, namely QR-CMBS, fingerprints and signatures contained in the database. Response time to find the most CMBS-QR is similar to 10 sample data, giving the effect of a higher degree of accuracy that is 97%.

Keywords: ***Multimodal biometrics system, Calculate similarity, CBIR image, gradient magnitude Prewitt***

1. INTRODUCTION

Previous research in the authentication login e-library using matching of facial templates that applied CBIR method has been prove achieve the accuracy level about 75% [12,13]. This multiple verification of identity data uses nature i.e., QR-code/ QR-CMBS, fingerprint and signature as input. This research oriented development system with the application of authentication login with QR-codes that contain binary data of the image of the fingerprint and signature.

The advantage of Retrieval CBIR is the popularity and test result with a highest degree of accuracy and time parameters. The results obtained from QR-CMBS every training i.e. classification and determine the value of fingerprint patterns and signatures for each label [14]. Feature extraction results are temporarily stored in the session database and compare the features that are stored in the database image classification. The most similar classification results will be displayed i.e. QR-CMBS, fingerprints and signatures, as well as verification of login.

The application login authentication system of e-library uses to calculate the similarity of this research, will be able to extract the feature of color, texture and edge of a multiple verification of QR-code/ QR-CMBS, fingerprint and signature by using the prewitt gradient. The result of the extraction process feature is then used by the software in the learning process and calculate the similarity. Learning image contained in 3 classes feature a picture that is stored in the data base query 100 png images and the image of the sample test with the size 400 x 400.

2. LITERATURE REVIEW

2.1. Types of Digital Biometrics

a. Digital Fingerprint

The biometric system is the system that has a capacity in verifying or identifying. The system uses same parameter in identity verification someone such as age, the kind impersonated claimed. But the requirement is the data for the system should be stored data in image texture, characteristics and gradient magnitude value of different gradient [2].

Overview of Multimodal biometrics has been done by Ross and Jain (2003). Their study proposed the various degrees of fusion, a variety of possible scenarios, different modes of operation, integration of strategy and design issues Multimodal systems can operate in one of three different modes: serial parallel mode, mode, or hierarchical mode. They argue Multimodal system can reduce the time the recognition overall. In parallel, operating mode information from multiple modalities are used simultaneously to perform recognition [2] for model fusion will have extraction the same data in the same data in two processes simultaneously, the development of which will be applied using image extraction system with multimodal QRMBS, signature, fingerprint and any data will be stored in the intensity of different gradient.

b. Digital Signature

In this paper, paper-based authentication implementation document presented. The integrity of the message text and the author of the document can be verified by using a digital signature and QR codes. The proposed Methodology can be automated or semi-automated. It's a semi-automatic when OCR is inaccurate and requires the user to visually compare text messages on paper and obtained from the QR code; however, this method provides convenience for users dealing with large amounts of data [4, 9].

The Elliptic Curve Digital Signature Algorithm (ECDSA) [10]. The security of the digital signature depends on the cryptographic hash function and the public key cryptographic algorithm. Our research will combined are a method of QR system is developed that is able to verify the data. In a development that will be developed that system with multimodal extracts QR-MBS image, signature, fingerprint and any data will be stored in the intensity gradient.

2.2. 2D Barcodes

The standard that defines the symbol printed and how devices such as barcode scanners read and decode the symbol is printed. A 2D barcode that General Data Matrix, PDF417, QR code and code Maxi [7, 17] and QR codes are 2D barcode which is composed of the square pattern of black on a white background. QR code contains information in the direction of vertical as well as horizontal Direction [16]. In our system will develop of a 2D barcode (two-dimensional barcode) that can store large amounts of signature, fingerprint filter with the Prewitt gradient magnitude total and distribution of the information without accessing the database.

2.3 Content Based Image Retrieval (CBIR)

The images are very rich in the content such as in colour, texture, and shape information which are presented in them. Retrieving images based on colour similarity is achieved by computing a colour histogram for each image that identifies the proportion of pixels within an image holding specific values (that humans express as colors) [6].

Colour searches will usually involve in comparing the colour of histograms, though this is not the only technique in practice. Texture measures look for visual patterns in images and how they are spatially defined. The identification of specific textures in an image is achieved primarily by modelling texture as a two dimensional grey level variation [14]. The relative level brightness of pairs of pixels are computed such in the degree of contrast, regularity, coarseness and directionality that may be estimated. The shape does not refer to the shape of an image, but to the shape of the particular region that is being sought out.

We will make shapes often be determined firstly by applying segmentation with method Prewitt gradient magnitude edge detection to an image. In our cases, the accurate shape detection with method prewitt gradient magnitude edge detection will require human intervention because methods like segmentation are very difficult to automate complete. Here are some discussions about shape extractions using gradient magnitude edge detection masks, like in Prewitt gradient operators.

2.3. 1 Shape Feature

Shape is the most important and most powerful feature used for image classification, indexing and retrievals. Shape information extracted using histogram for edge detection. The edge information in the image is obtained by using the Prewitt edge detection [14].

In shape, we will segmentation of two Prewitt gradient magnitude edge detection are two images which at each point contain the horizontal and vertical derivative approximation techniques. Shapes representations can be generally divided into two categories, they are Boundary based and Region-based, see Figure 1.

2.3 2 Prewitt Edge Detection Technique

The Prewitt operator performs spatial gradient magnitude measurement in an image. The applying convolution K to pixel group p can be represented as [11]:

$$N(x,y) = \sum_{k=-1}^{1} \sum_{j=-1}^{1} K(j,k)\, p(x-j, y-k) \quad (1)$$

The Prewitt Edge Detector uses two convolution kernels, one is to detect changes in vertical contrast (hx) and the other is to detect horizontal contrast (hy). Figure 2 shows the Prewitt Edge Detector uses two convolution kernels, one is to detect changes in vertical contrast (hx) and the other is to detect horizontal contrast (hy).

Figure 1 Region based Images

$$h_x = \begin{bmatrix} -1 & 0 & 1 \\ -1 & 0 & 1 \\ -1 & 0 & 1 \end{bmatrix} \qquad h_y = \begin{bmatrix} -1 & -1 & -1 \\ 0 & 0 & 0 \\ 1 & 1 & 1 \end{bmatrix}$$

Figure 2 Detect vertical contrast (hx) and Detect horizontal contrast (hy).

Pandapotan Siagian (2013), these kernels are designed to respond maximal to the edges, running vertically and horizontally, relative to the pixel grid, one kernel for each of the two perpendicular orientations. The kernels can be applied separately to the input image, to produce separate measurements of the gradient component in each orientation (call these *Gx* and *Gy*) [14].

We are can combine altogether to find the magnitude of the gradient at each point and the orientation of that gradient [14]. Typically, the steps used to find the similarity of gradient magnitude at each point in an input it fingerprints and signatures can be seen as follow:

a) The image is fingerprint and signatures in format png with image size are 400 x 400 results.
b) A data fingerprint and signatures on the shapes often be determined firstly by applying segmentation with method prewitt gradient magnitude edge detection. This method uses two convolution kernels, one is to detect changes in vertical contrast (hx) and the other is to detect horizontal contrast (hy). is stored in the directory
c) Prewitt edge detector uses a pair of 3×3 convolution masks, one is to estimate the gradient in the x-direction (columns) and the other is to estimate the gradient in the y-direction (rows).
d) A convolution mask is usually much smaller than the actual image. As the result, the mask is slid over the image, manipulating a square of pixels at a time.
e) If we define A as the source image, and Gx and Gy are two images which at each point contain the horizontal and vertical derivative approximations, then the masks will be marked as follows :

-1	0	1	-1	-1	-1
-1	0	1	0	0	0
-1	0	1	1	1	1
Gx			Gy		

The magnitude of the gradient is then calculated using the formula:

$$|G| = \sqrt{G^2 x + G^2 y} \quad (2)$$

f) Approximate magnitude can be calculated using:

$$|G| = |Gx| + |Gy| \quad (3)$$

g) The angle of the orientation of the edge (relative to the pixel grid) which is giving rise to the spatial gradient is given by: $\theta = \arctan(Gy / Gx)$, when G_x = δf/δx, Gy = δf/δy (4).

3. IMPLEMENTATION

In our system, QR-CMBS every individual, will store data from identity ID, fingerprint patterns and signature patterns. The application performs a two stage process i.e., the processing of learning and classification :

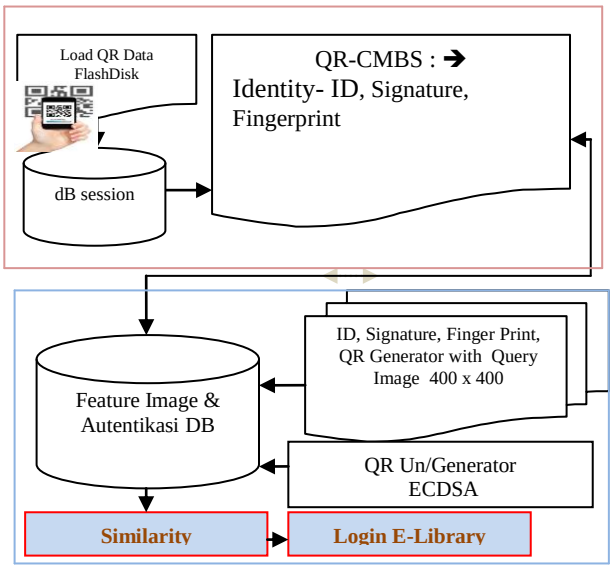


Figure 3 System Overview

The input process of learning is the learning process with the input images stored in a database with three classes of data, namely the identity-ID, image of fingerprint patterns and pattern signatures.

As for the login authentication data using three classes of data training in database i.e. identity ID, fingerprints and signatures to each individual.

Data fingerprints and signatures on the filter with the gradient magnitude prewit stored in directories, hand prints and drawings of the gradient magnitude prewitt fingerprints and hand every individual in shape with the QR code with the code and decode the QR generator results in bineri code will be stored in QR-CMBS.

The system will verify with 3 classes of data, stages of the search process is most similar to QR-CMBS, identity ID,signature and fingerprint image stored in the database. This system is a web-based application. The system will calculate and display similarity 3 pictures at once. The image that is displayed will be classified by identity ID, fingerprint and signature. The overall system is shown in Figure 3.

3.1. Learning Process

The process of classification of the QR-CMBS when user login to the system. The system will process the QR generator code and segmentation code of identity ID, fingerprint patterns and signature patterns. The results will be compared to code Segmentation, search for identity ID, fingerprint patterns and signature patterns are most similar to data in the database. Proses code, decode QR-CMBS is shown in Figure 4 and the learning proses system is shown in Figure 5.

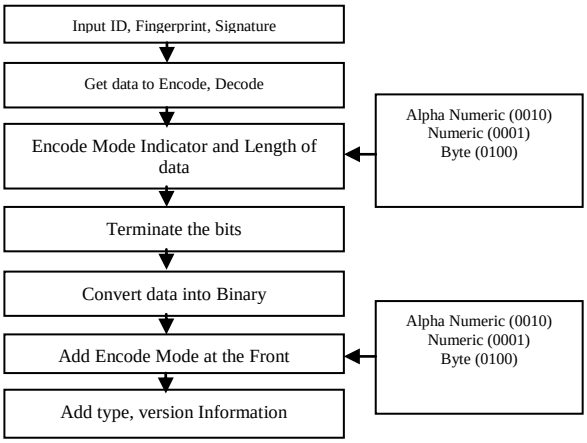


Figure 4 Proses Code and Decode QR

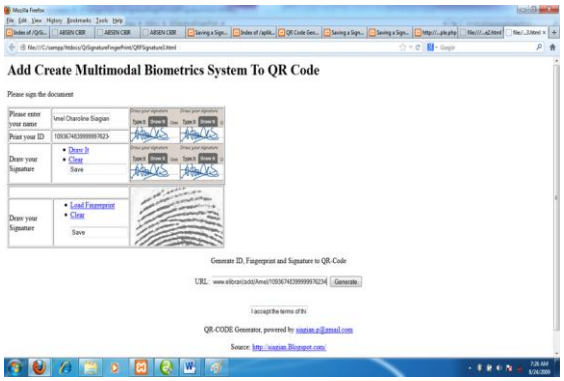


Figure 5 The learning proses system

The process of digitizing images (fingerprint, signature), consist of :

a) The data image of signature , fingerfrint are conversion to png and size 40 x 40.
b) Prewitt gradient magnitude is uses two convolution kernels, one is to detect changes in vertical contrast (Hx) and the other is to detect horizontal contrast (Hy). The data is stored in the directory a fingerprint and signature. The image is result of prewitt gradient magnitude for fingerprints and signatures every individual in kind in with QR code and stored in QR-CMBS.
c) The data of signature and fingerprint with file name according to saving entered and create multimodal biometrics systems of QR-CMBS.
d) The results of the digital data pre-process to signature, fingerprint on encode QR-CMBS generate by entered a different identity-ID.

3.2. Classification

The process of classification is a process of test QR-CMBS one individual that is loaded or capture image QR-CMBS from display screen a mobile phone. The QR-CMBS are encoded and data binary code is extraction of fingerprint patterns and signature patterns. Feature extraction results are temporarily stored in the dB session will compare features that are stored in the database image classification. This test is determine values of fingerprint patterns and signature patterns for each labels and display the original images from QR-CMBS, identity-ID, fingerprint, signature are most similarity. The classification system has training and calculated a similarity. The data are showing in Figure 6. and The display of training result a similarity is shown in Figure 7.

The step a process classification can consist of :

a) Read the data of fingerprint, signature, QR-CMBS from db session.
b) The data dB session are compare with data in database system.
c) Display a based on almost identical of fingerprint patterns, signature patterns , QR-CMRS.
d) Automatically are correlates with your name and user identity-ID contained in the database system of participants.

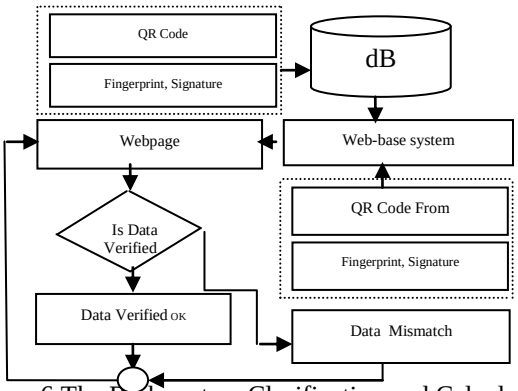


Figure 6 The Blok system Clasification and Calculate Similarity

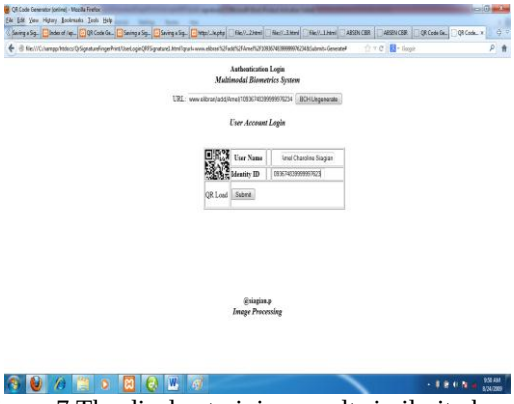


Figure 7 The display training result similarity by Administrator

4. AUTHENTICATION LOGIN AND VERIFICATION

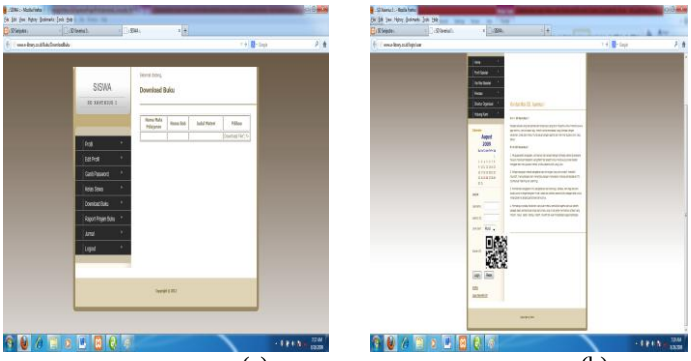
4.1. QR- Code Multimodal Biometrics System (QR-CMBS)

Multimodal biometric systems-QR code in connect with the database information of user. Admin system will be register users and identity-ID, signature, fingerprint of user will be done extraction. The image QR-CMBS are encode. A result extraction is stored to imagery session and such data will compares the features that are stored in the database image classification. If QR-CMBS data are similarity, then the identity of the user-ID will appear in the system. Data each user is made up of people's names, birth date, identity-ID, signature and fingerprints in conversion with QR code generator and rendering to QR-CMBS, is size 7.099 characters.

4.2. Verification of Authentication Login

The verification is QR-CMBS every individual for authentication login an e-library. QR-CMBS are enrolled from all the students and stored in the database. The fingerprint, signature differs from person to person. The QR-CMBS are recognition refers to the automated method of verifying a match between two human QR-CMBS.

QR-CMBS verification the QR codes (identity-ID, signature patterns, fingerprint patterns) are stored in the database. During the runtime the QR Code is read from the QR-CMBS. The decoded detail are compared with database. If the detail are matched means the QR-CMBS was displayed. The visual representation of our work example gives maximum accuracy in login systems. Some of the visual representation of the output will be presented below in Figure 8 (a), (b).



(a) (b)

Figure 8 Authentication and Verification (a) Login with QR-CMBS (b) access system e-library

Table 1 Data Calculate Similarity QR-CMBS

3 Class Train	Data Calculate Similarity QR-CMBS									
	1	2	3	4	5	6	7	8	9	10
QR-CRMS	1.71	2.71	1.91	1.38	2.38	2.71	1.73	1.73	2.81	1.62
Signature	2.05	2.05	2.83	1.39	1.39	2.81	1.4	1.4	1.81	1,72
Finger	2.72	2.72	2.9	1.96	1.06	1.61	1.07	1.07	1.91	1.72
Average	2.16		2.54	1.57	1.61	2.37	1.4	1.4	2.17	1.11

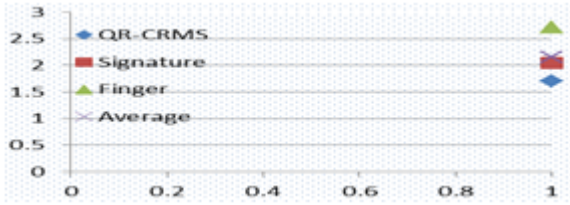


Figure 10 Result Times

5. RESULTS AND DISCUSSION

Data sample QR-CMBS every individual which is already stored in a database is 100 sample. Every individual that is already registered QR-CMBS in the system can perform the login authentication to access the e-library. The classification system will encoding and decoding the data input QR-CMBS. Results Data encode or decode from fingerprints, signatures will be compared to the three classes of data training in database i.e. QR-CMBS, fingerprints and signature to each individual.

Testing data QR-CMBS every individual is tested to 10 tests. QR-CMBS in the 10 test data and the test results in Table 1.

6. CONCLUSION

Authentication login using the 3 classes in the training data in a database that is QR-CMBS, fingerprints and signature to each individual. A data fingerprint patterns and signature patterns are process, classification, based on ektraksi characteristics by method of magnitude gradient prewitt. The ektraksi results of each patterns for each user is stored in the database. The classification result ektraksi hallmark of fingerprint patterns and signature patterns are rendering to QR-CMBS.

The system will verify by 3 classes of data such as: identity-ID, signature patterns, and fingerprint image. The results of test using 100 samples show that accuracy rate are of the testing is 95%.

The QR-CMBS verification can be done automatically and quickly, because the average size of the QR-CMBS data stored in the database of 2.78 kbps. So, when classification can be done quickly in an average time of 2.8 seconds. Verification method is more effective than previous methods, and we identify the people using biometric techniques. Because this technique the righteous also identified.

Acknowledgement. Pandapotan Siagian was born on March 18 1974 in North Sumatra, Indonesia. He received degree from Nommensen University, Medan in 1999, and master degree in Electrical Engineering from Gajah Mada University of Yogyakarta in 2010. He is Information Technology Consultant in Jambi. He is current research interests include Computer Vision, Web Development, database, computational geometry, medical, computer network, Telecommunication.

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