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Security enhancement for finger print using double encryption and fuzzy vault scheme

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Abstract: Security is a major crisis which is faced by everyone in the world. Due to increase in data theft and data hacking it is very essential to build a security system to protect the data which result in the usage of passwords and keys. This method involves the user to memorize the password and key which can be easily lost by the user or broken by the hacker which leads to the development of a better security system. Biometric features have the variety of advantages compared to other features. Biometric features are unique and cannot be misused by others .The most commonly used biometric features face, palm, retina and fingerprint. Among which fingerprint is the oldest method of recognition with high accuracy .This paper focus on using the fingerprint biometric feature for developing the security system with fuzzy vault. Double encryption and chaos encryption are used for encryption process. Also, the experimental result shows that better security is achieved with fuzzy vault.

Keywords: fuzzy vault scheme, Chaos encryption, Double encryption, finger print image.

I . INTRODUCTION

The privacy of the user is an important factor that has major concern in the present digital world. The biometric based authentication method is designed to provide a high level of security applications. The biometric based encryption is required to access the authenticity. So this type of security system provides high level of security. The under lying idea is to derive protected version of the enrolled template and to store it instead of the first one. Fingerprint identification is widely used in most of the cases for identification of a person [1]

Because it is unique for everyone and the extraction of fingerprint feature is a difficult process. The fingerprint features are very difficult to extract in the case of elderly peoples, laborers, and handicapped peoples as the prints will not be clear or damaged. As a result, many other biometric features are also increasing attention. The encryption keys are generated using lower level biometric features. The work detailed in this paper is to generate a set of symmetric and asymmetric key using cryptographic system [2] into fuzzy vault. Moreover, some other biometric features such as palm prints or iris can also be integrated along with the existing authentication security system to provide enhanced level of security in personal authentication.

II . PROPOSED SYSTEM

In the Proposed system that is, Security enhancement for finger print using double encryption and fuzzy vault scheme. The Finger print Image is an input test image which is taken and encrypted using chaos encryption algorithm. The Fuzzy vault matrix is created which is encrypted using double encryption algorithm. The features are extracted from the finger print image and are embedded in the fuzzy vault which is created. From the fuzzy vault in which the fingerprint test image features are embedded the features are extracted. These features will only be displayed to the fuzzy vault. The data set image consists of various samples of features from finger print images. The features of the image are matched with test image [3]. Depending on the similarities [12] the output is obtained [4]. The result will be authenticating if both images match.

A.FINGER PRINT IMAGE

Here the intensity values in an input image are standardized using normalization process. Normalization is nothing but a process used to standardize the intensity values in an input finger print image by varying the grey level values [6]. But these values should lie within the range. Normalization is a very important process. The main aim of this process is to reduce the variations in fingerprint grey level values variations that is ridge and valley structures [20]. Normalization process does not produce any variations in clarity of ridge and valley in a finger print image. When the normalization process gets finished the image can extract the features from the finger print pattern [10].

Figure 1 Normal image

Figure 2 Normalized image

B.FUZZY VAULT

Fuzzy Vault is an encryption scheme proposed by Jules and Sudan [5] which has the error-correcting codes as a concept. The message is encrypted in a way such that the encrypted message cannot be recovered without the key which was used for encryption. In this fuzzy vault[11] the secret message (e.g. biometric key) is embedded in a

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polynomial as its coefficients after being transmitted as an unordered string, and the values computed by the polynomial could be added with some other points which are not lie on the polynomial to form a fuzzy vault[19]

C.CHAOS ENCRYPTION

After extracting the features from the input finger print image it is to be encrypted. So, the encryption process used is chaos encryption method. Chaos encryption is more advanced encryption method used to transmit more important information via unsecured channel path efficiently without any data lost. In this chaos encryption process input image pixel values are encrypted with chaotic encryption key with threshold value using bit-xor operation. Here the chaotic map values are generated using logistic map [7].

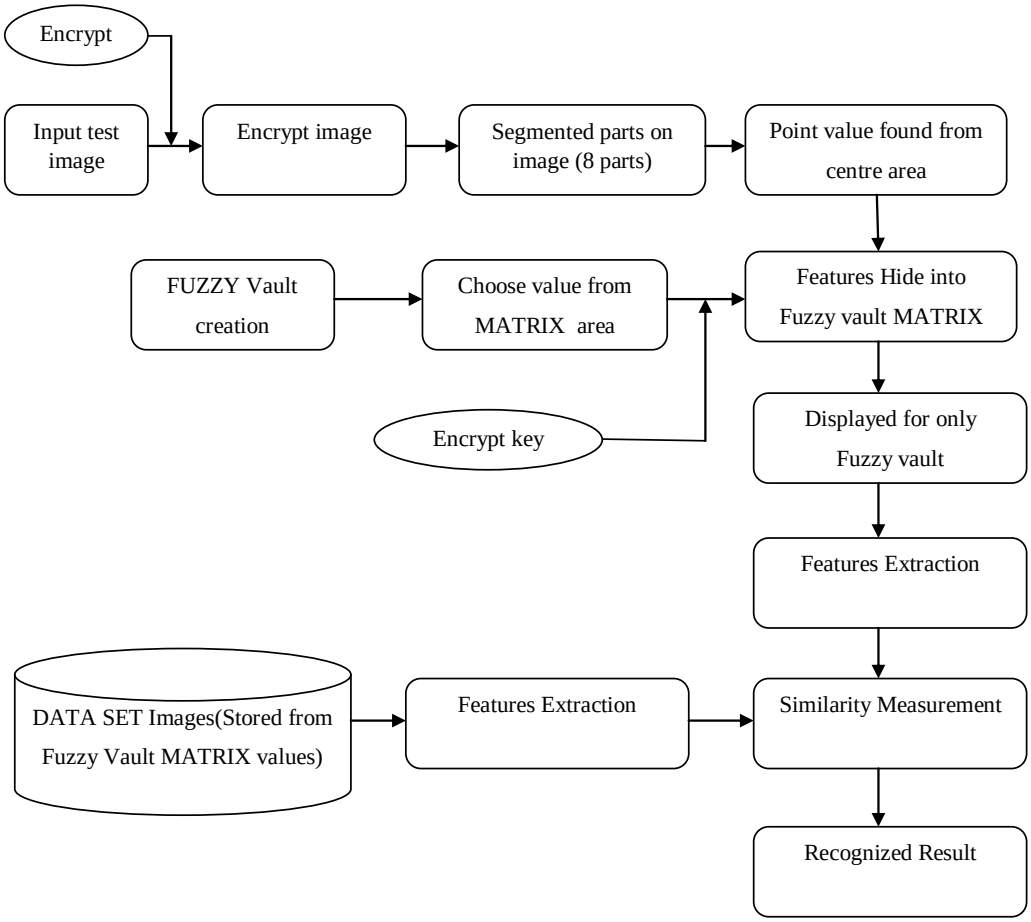
D.DOUBLE ENCRYPTION

Double encryption is the process used to solve the problems in symmetric and asymmetric cryptography process. First the input image is encrypted using fast symmetric algorithm. Then using asymmetric cryptography secret key is encrypted. Compared to symmetric cryptography, asymmetric cryptography is slow in process. But it is very efficiently used to encrypt the key which is small in size. For fast decryption [9] of the message symmetric key is used. This double encryption process not only used to solving the problem related to symmetric and asymmetric approach but it also gives easy computation progress and high performance.

III . BLOCK DIAGRAM

Firstly, the input test image is a finger print image which is encrypted using Chaos encryption algorithm. The chaos encrypted image is segmented into 8 parts. The point values are extracted from the segmented finger print image [13]. Fuzzy vault is an encryption scheme used to encode information in a different way such that the information cannot be recovered without the key. Fuzzy vault is nothing but a fifth order polynomial distribution function [16]. The matrix is generated with fuzzy vault. The values are selected from the generated matrix and encryption of the values is done using the encryption key. The encryption used is the double encryption. The point values which are extracted from the segmented image are embedded in the fuzzy vault. The features such as mean and entropy are again extracted [18] from the fuzzy vault in which point values are embedded.

The image which is required for testing is selected from the data set in which the finger print images are stored [17]. The features are extracted from the image and the similarities are measured [12] .depending on the matching of test image and data set images the result is obtained. If both the images match the output will be authenticate [8] if not it will be unauthenticated [15].



Block diagram

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IV . EXPERIMENTAL RESULTS

The proposed output of this project is to verify the fingerprint and to produce output as authenticate or an unauthenticated one. The features which are extracted from the input image are compared with the features of the data set image. If the input test image matches with the data set images the fingerprint image is termed as an authenticate image. The major advantage of this project lies in the fact that the entire image is not compared but only the extracted features are compared for verification as well as for storage in the database. The proposed method is accurate enough to authenticate a person.

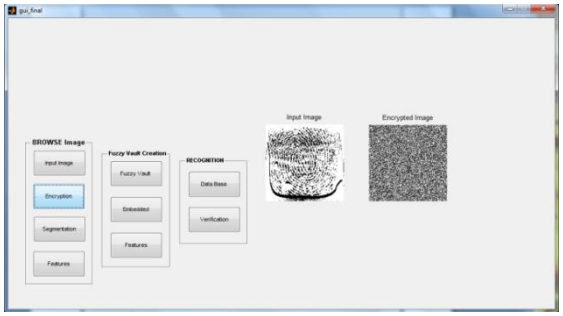

Figure3 Encryption of input image

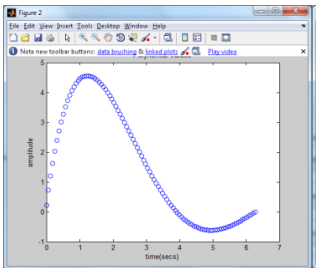

Figure 4 Fuzzy vault creation

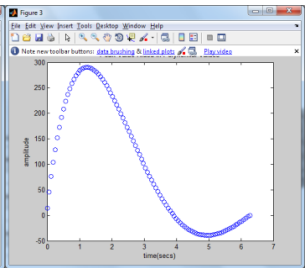

Figure 5 Embedding the Features in Fuzzy vault

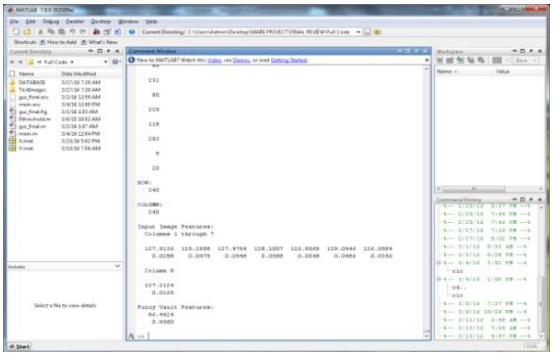

Figure 6 Extraction of features

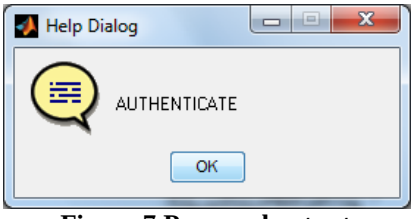

Figure 7 Proposed output

V . CONCLUSION

This paper has investigated a new approach to construct the fuzzy vault using fingerprint features. Biometrics in cryptography domain is really a better option to make system more secure in order to combine cryptography with fingerprints. The implemented of double encryption is suggested. This can efficiently reduce the possibility of hacking within a cryptosystem. The fingerprint can be used as a promising biometric in the construction of a cryptosystem. Reconstruction of polynomial of high power with at most accuracy is somewhat very tedious job and method really lags in this phase. Therefore better polynomial formation and precision is challenge in this work.

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