Voter Authentication System Using Fusion Process

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Abstract
This voter identity verification system using fusion processauthenticates anindividualby means of three biometric features i.e; face, iris, palm with fusiontechnique.Thefeatures are obtained frompreprocessed images of face, iris, palm. The features of input image areequated withthe database image and a password is enteredto uphold validity. This contains mainly three stages i.e; pre-processing, DWTsegmentation and the fusion part.As soon as fusionmodule is done, the person is said to be either a valid voter or an invalid voter.

Keywords: authentication, biometric features, fusion, DWT segmentation.

1. Introduction

BiometricsRefers to a technology that performs personal authentication using the special physical characteristics of individual. From the time when cognizance science evolves, researchers have studied biometric technologies uses a variety of human characteristics and scope of discipline is expanding from traditionally-used features, such as fingerprints, faces, and irises, to palm prints [5]. In latest years, biometrics identification such as face, iris, fingerprints and DNA acquire a widespread of attention, mainly in the part of human detection, authentication. When comparing withregular password-based authentication, biometrics holds the significances of uniqueness, distinctive, mobility, person friendliness and no longer transferable. [19]

In real-world applications, a massive wide variety of aspects, such as ecological conditions, light variants, replica attacks, restrict the complete performance of single mode biological characteristicapproacheswhich include palmprint identification.Furthermore, when dealing withthe identification situation which do not possess any boundaries,unimodal recognition performance might also exhibit a slight reduction.To overcome these obstacles, multi-biometrics, the fusion of distinct unimodal biometrics, has attracted developing attentions from researchers [16].

In many places the voting is done using electronic voting systems which are using cryptanalytic procedures and paper-based process which may result in double voting and once in a while false voting can take place. For voting procedures it is not such secure with existing methods. So, using of Biometrics is optimum solution in order to persist safety,secrecy as the biometric features or characteristics are not same, they are unique for every individual. So, they are not shared or copied from others like passwords. And most prominently many of the systems use only single biometric trait. The limitation with only making use of single biometric feature may have minimal protection and if any accident occurs to the person, then their facets are unable to identify if single biometric trait is used.So,to overcome this, using of multi-biometric characteristics is helpful which can be done by combining all the characteristics of an individual biometrics into a single image with thepractices or methods of processing images which have all the essential data and also the features. So, using of multi biometrics is more protected and helps in reducing the false voting, double voting. And if one biometric feature [18] isnot recognized, another one can be used to recognize the person and helps in verifying and authenticating the person.

2.Literature Survey

2.1. A secure end-to-end verifiable internet-voting system using identity-based blind signature.

This papercame up with the end-to-end verifiable system which works to verify the user using the distinctive identification allotted by the authority along with their biometricqualities [17]. This system uses Identity-based blind signature for protecting the vote from alteration.

2.2. Finger-vein recognition based on densely connected convolutional network using score-level fusion with shape and texture images

This paper brings about an improved performance identification system using finger-vein with deepCNN [20-21]. The performance of fusion by score levelbetweentexture and shape images where the extraction of finger vein is not employedfor texture images and extraction of finger vein extraction is employed for shape images. This system identifiessections of rough finger vein through image to minimal the consequences raised because of mis-segmented regions.This is mainly presented to beat the limitation of finger vein recognition of shape image. [22-23]

2.3.A secure verifiable ranked choice online voting system based on homomorphic encryption.

This paper came with ElGamal cryptosystem which provides the confidentiality. And this online voting system mainly works on rank based where the voter can give points to different persons i.e; the individual who cast his vote can allocate equal points to the different persons or he may give different points to different person [24-25]. The ballot will remainencrypted always and also before submission. Here the main disadvantage isat least oneperson from authorityto be honest as verification of the voter regarding eligibility and submission can be done by anyone from the authority.

2.4. Enhanced human face recognition using lbph descriptor, multi-knn, and back-propagation neural network

The paper deals with human face recognition frameworkthat is bettered and improved.This framework make use of LBPH descriptor, multi-KNN, and BPNN neural network. Where LBPH descriptor, multi-KNNfacilitates in providing a training dataset with different patterns on basis of association betweenactual training images.The BPNN neural network comes with rapid and increased accuracy by newly attained dataset.[26]. Thehigh and fast accuracy was reached by uniting the distance methods because every single distance method has its special benefits while comparing with other distance method thus this made the entire system to make stronger.

3. Related Work

As everyone know that our country is a democratic, where polling has a crucial part for the change and development of the nation. But the authorities have to take care that the process of voting should be done genuinely[27]. There are many systems implemented to decrease forgedpolling as well as to protect the votes from modification. In many locations the voting takes place through ballot process and using electronic voting machines. There are also the voting systems came up to cast one's vote using the biometrics. The use of biometrics has been increasing day by day as and they are been using in lot many applications to identify, verifyan individual. As the biometrics are physical qualities of human being, they are not given to any other person like passwords.Hence using of biometrics to identify or validate is much secure. Where these types of systems make use of cryptographic algorithms, Networks etc. Some voting systems uses the person from the voting authority which in turn leads to less privacy of the voter and similarly there is also a possibility of less security until and unless onepersonfrom the authority is trusty. Majority of the systemsmake use of biometrics that are single trait of the person to validate or recognizei.e.; either face, fingerprint, iris, or ear etc. Within these physical qualities, in most of the applications we see thehuman face, fingerprint in use generally and iris or eyes and ears very rarely.

Generally,using of unimodal biological character of an individual is less secure. So, using of multiplephysical characteristics or features of an individual to recognize or authenticate have maximumsecurityi.e.; using of bimodal biometrics or more biological traits of a person.

4.Proposed System

The proposed voting authentication system uses a multiple biometric featuresi.e.; images of face, iris, palmof aperson to validate whether that particular person isvalid voter or invalid voter.

4.1. Methodology

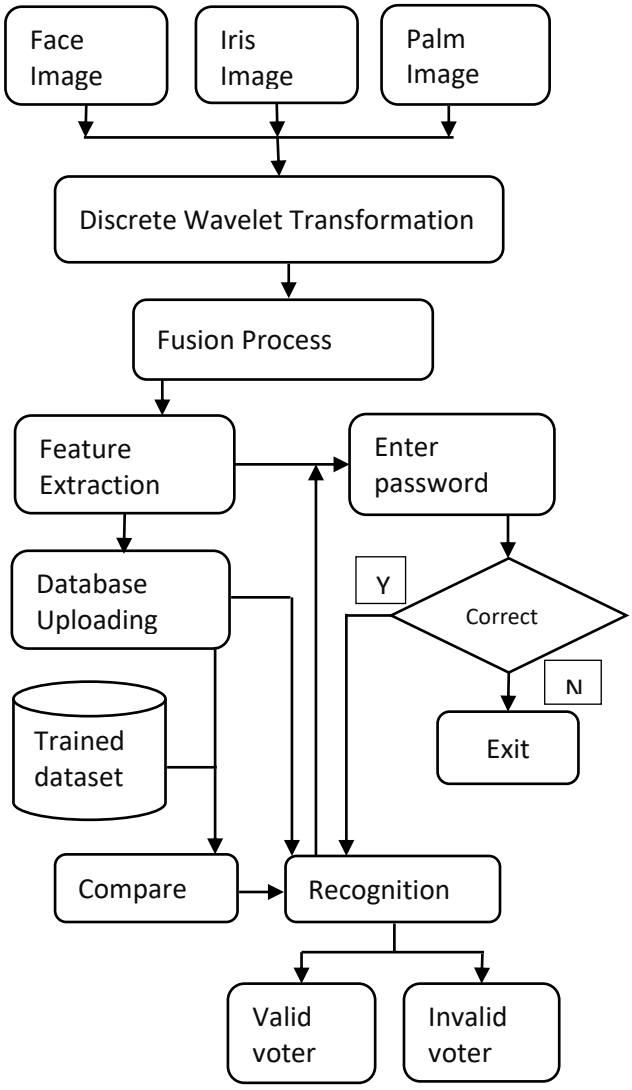

Figure 1. Flow diagram for voter authentication system using fusion process

4.1.1. Input selection

Primarily, We want to capture face, iris and palm images of anindividual.Once the graphical user interfacelaunches, we see various modules and the first one is selecting inputs, these inputs are selected one after the another from their respective folders, in order to validate whether the person is a valid voter or invalid voter.

4.1.2. Pre-processing

After selecting the inputs,the next step to be performed is the pre-processing step.In this step if there are any colour images,those colour images should be changed to grayscale images and the all images areresized to 256 rows and 256 columns.

4.1.3. Dwt: discrete wavelet transformation

The discrete wavelet transformation is an edge filtering process which decomposes the input image hierarchically.The main purpose of using this DWT is, it gathers all the important edges information from the given image. The input image decomposes by four channels using discrete wavelet transformation: LL,LH,HL,HH.The first letter represents either less rate process or maximum rate operation to rows, whereas subsequentletter represents to the filter that is applied to columns. The LL have minimal level of resolution which contains approximately the input image. The another three levels of resolution contain detail parts of input image and also give frequencies of vertical high (LH) and horizontal high (HL), high(HH). Figure2:depicts all the four channels how an image is decomposed into when the input image is given to undergo the discrete wavelet transformation.

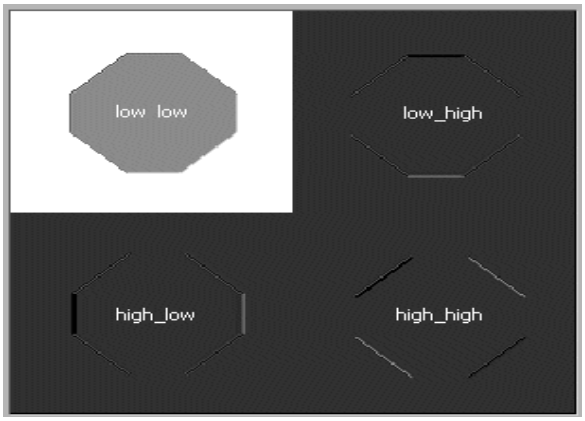

Figure 2. Four channels in Discrete Wavelet Transformation.

4.1.4. Fusion process

In this fusion module the DWT images of face, palm and iris which contains information regarding edges of the given input images with four channels is considered. Each channel from all the three DWT segmented images the important features are combined i.e.; by considering all the LL channels of face, iris and palm imagesand combine the characteristics,likewise, the LH channels of all the three inputted image characteristics are united and in same manner the HL, HH channels are also combined. After combining all the channels we get F11, F22, F33, F44.Now only one image which is original is formed on combining F11, F22, F33, F44 channels, that imagecontain all essentialcharacteristics which is obtained on performing inverse discrete wavelet transformation.

4.1.5. Feature extraction and recognition

While extracting the featuresa password is entered for security reasons so that unauthorized people do not extract features. Once, the characteristics are extracted those are loaded to the database. Next, the extracted features ofinputted image and features present in the database are compared each other. Finally, the recognition is carried out. Whileidentifying,once againpassword is entered and matches correctly then identification process undergoes and iffeatures obtained from input image and features in database matchesit gives the result as valid, if featuresdo not match it gives the result as invalid. While identification, if certain password is notmatched withpassword given during feature extraction the system will exit.

5. Results

In this results section let us have a look how the working of the system is.

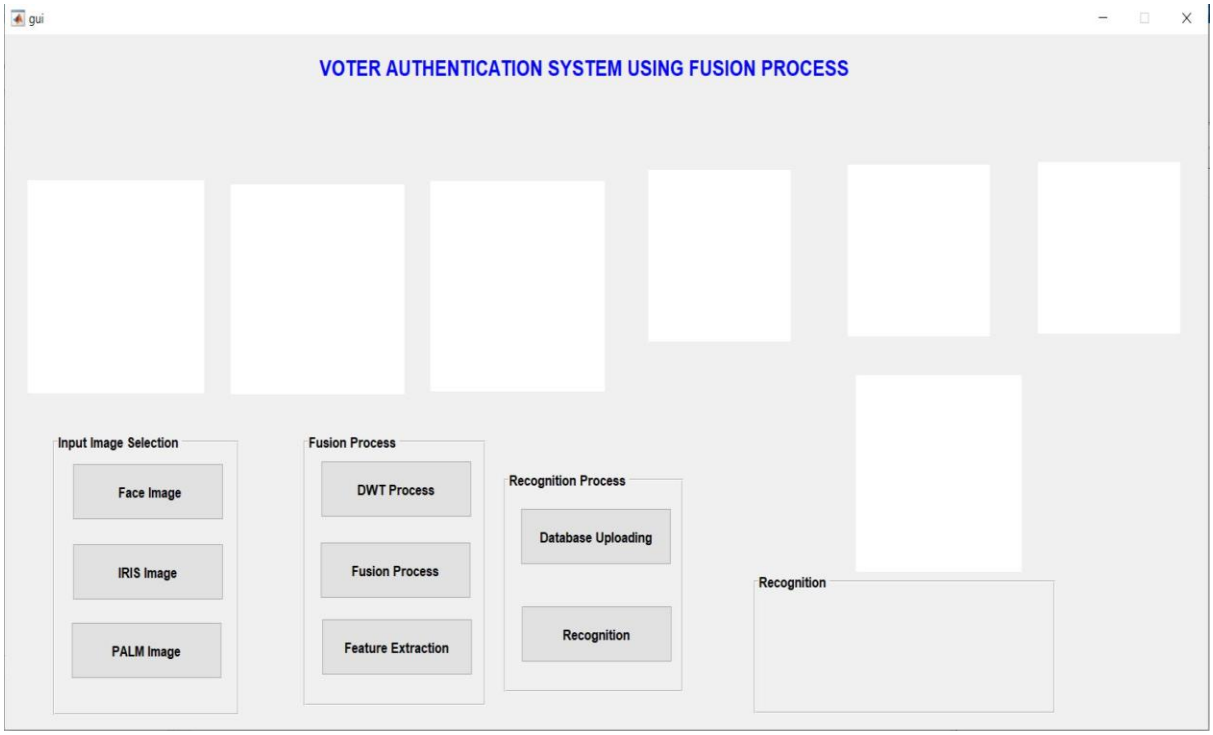

Figure 3. The graphical user interface of the voter authentication system using fusion process.

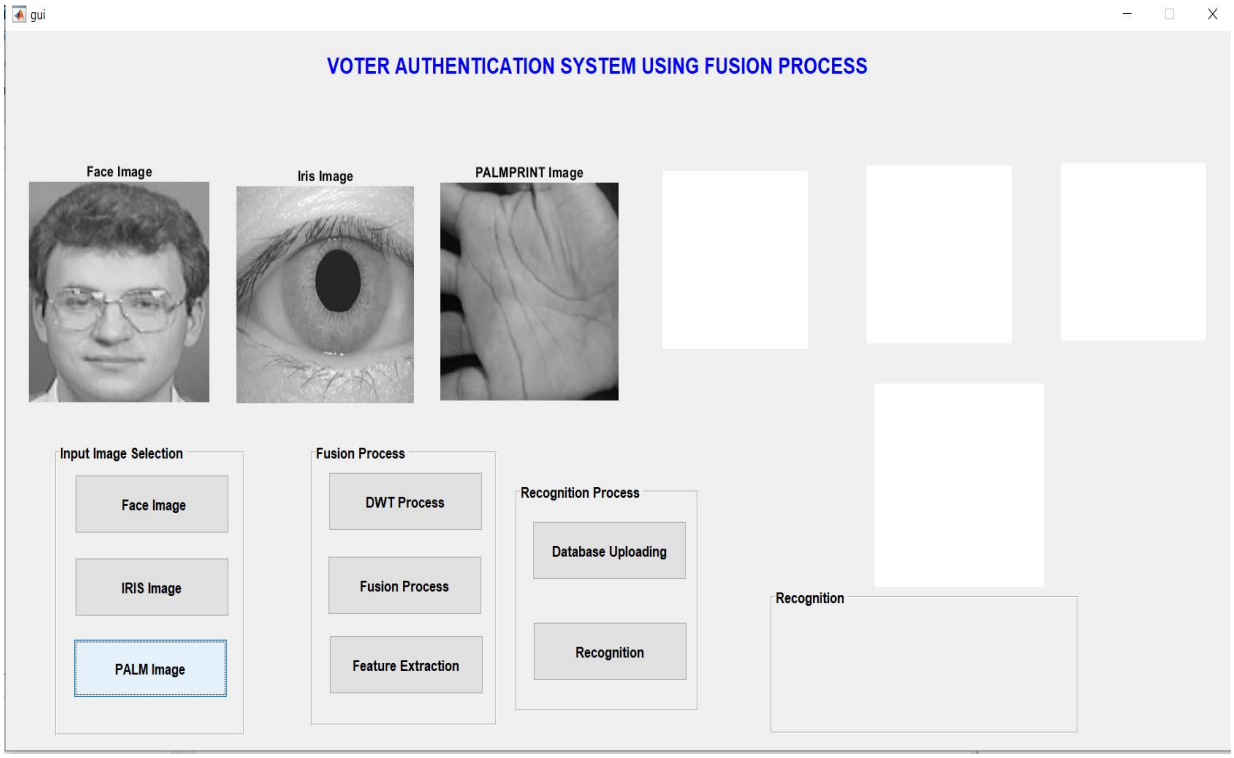

Figure 4. Selecting of inputs i.e.; select face image, palm image and iris image of the person.

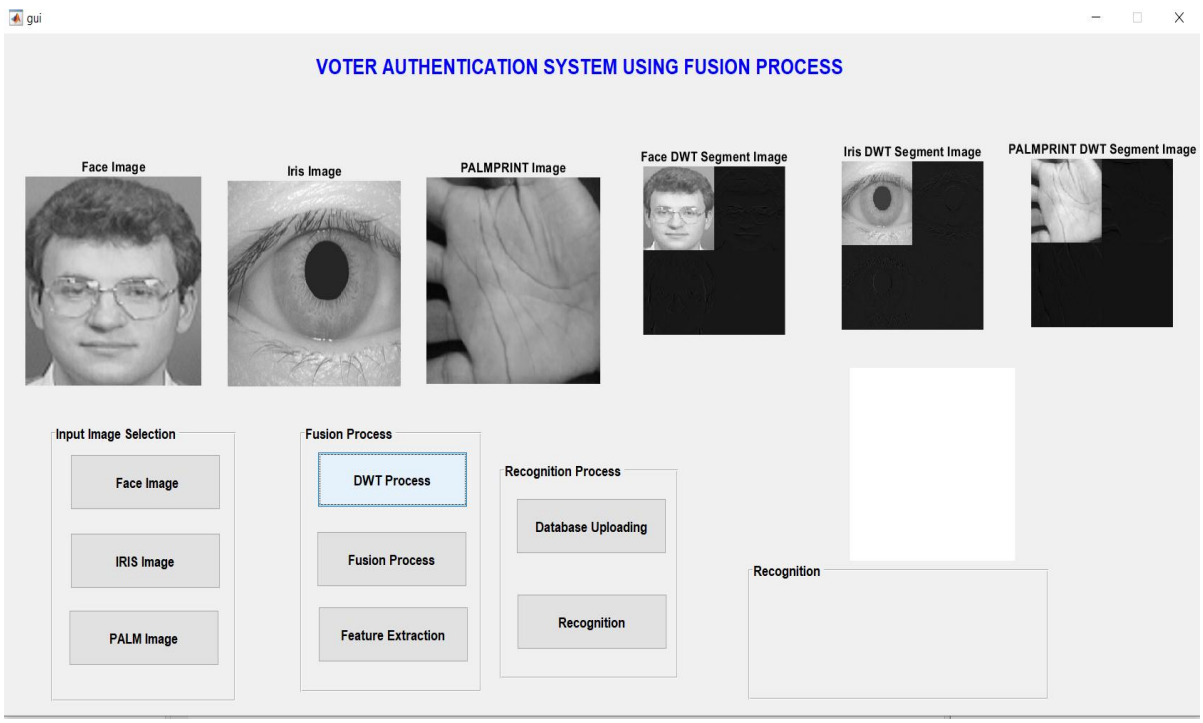

Figure 5. Applying DWT (Discrete wavelet transformation) process for the selected face image, iris image and palm image.

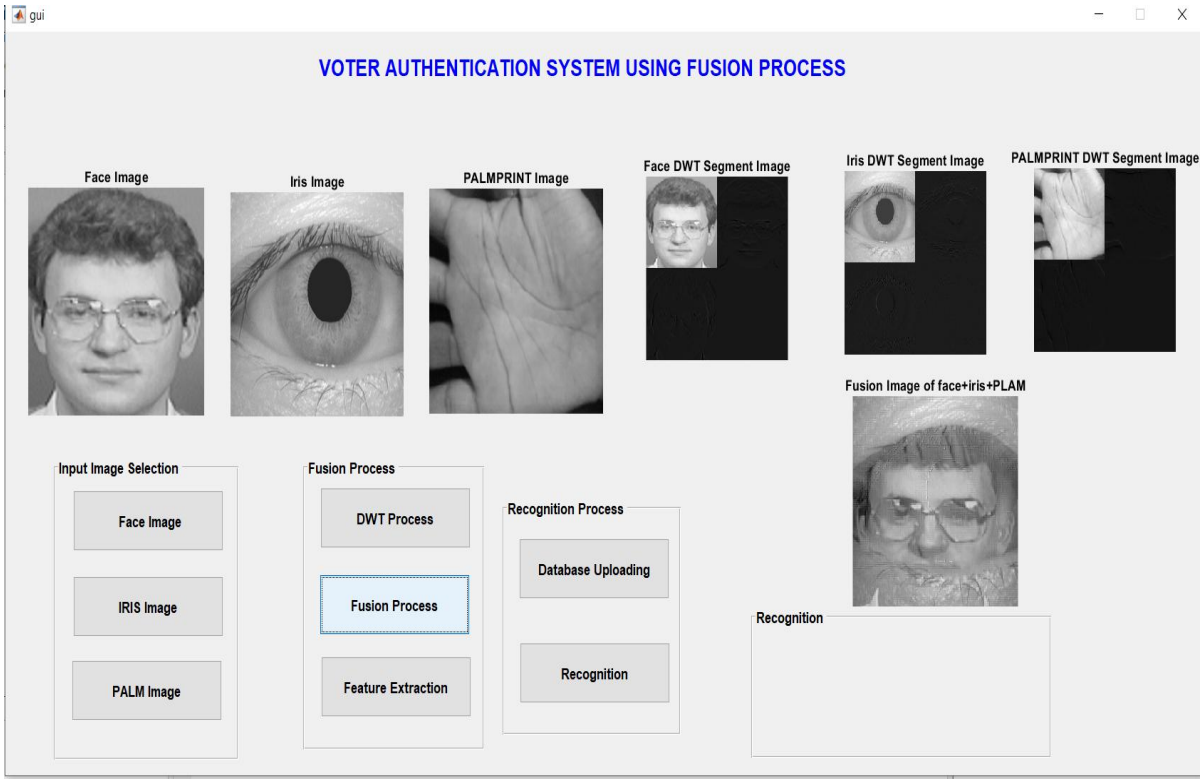

Figure 6. Performing Fusion process for the DWT segmented face, iris, palm image.

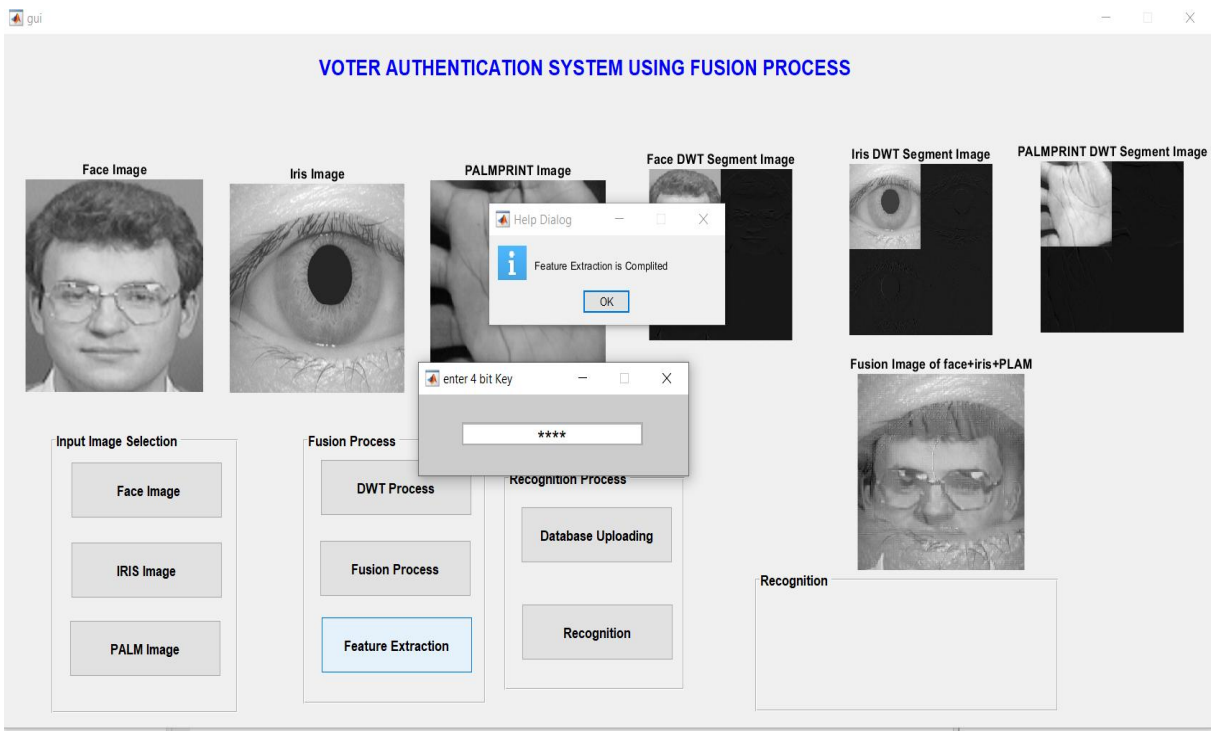

Figure 7. Extracting features and password authentication.

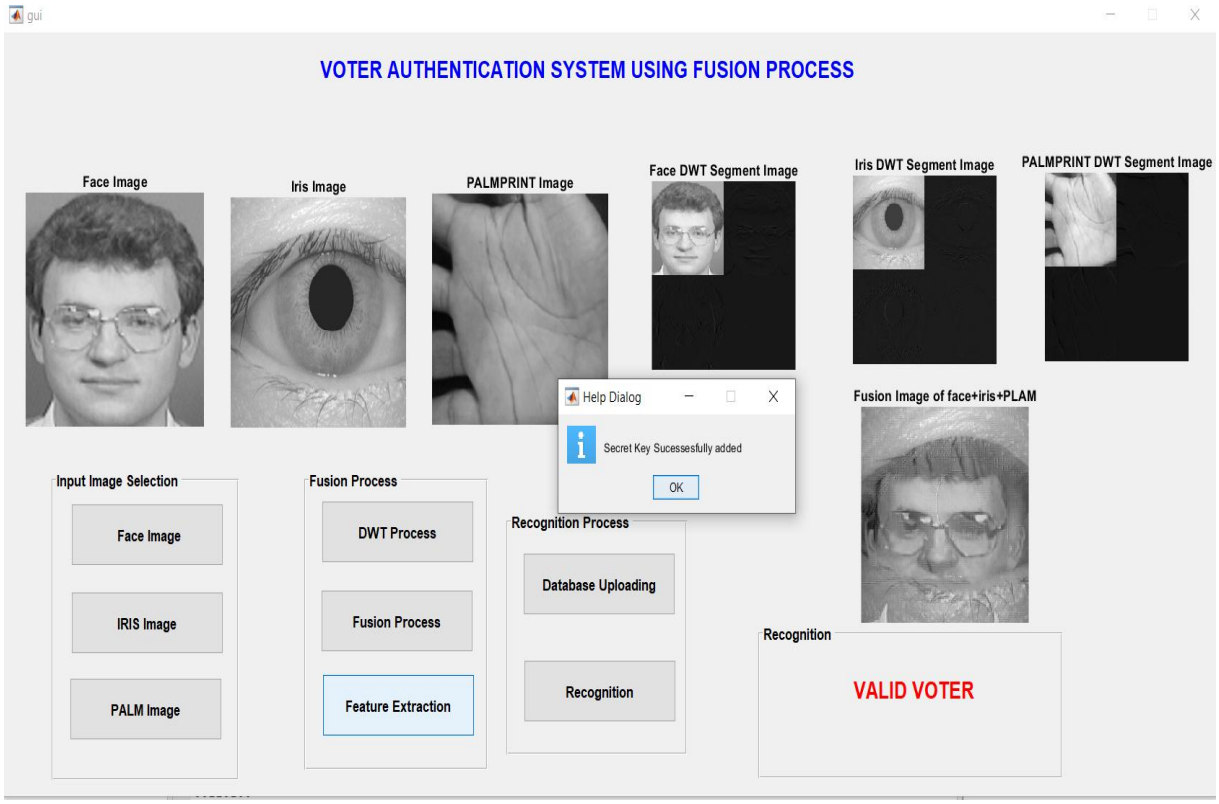

Figure 8. Recognizing and showing the person is a valid voter.

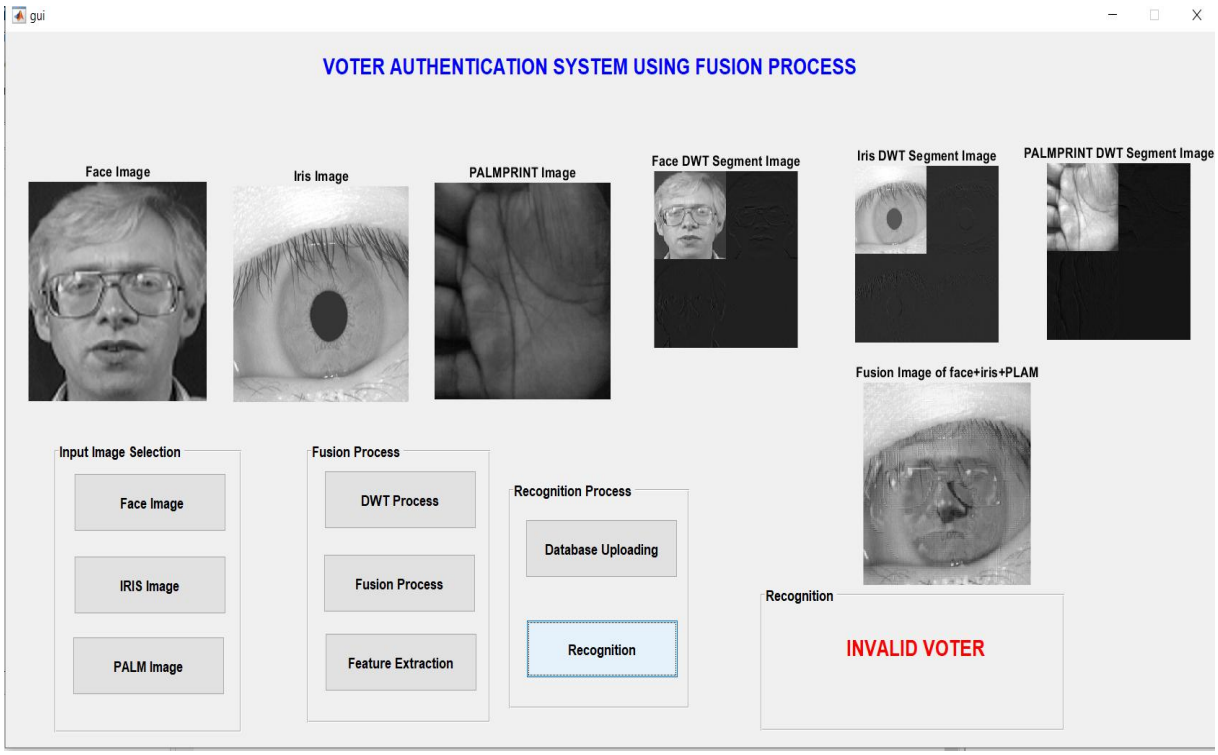

Figure 9. Showing the person is invalid

6. Conclusion

This voter identity verification system using fusion process uses multiple biometrics of the person to authenticate whether the particular person is a valid voter or invalid vote. There are severalsystems where it uses single biometric trait. There might be a situation that the biometric cannot be recognised when using single trait and exists a possibility of minimum security. So, in order to get out of the possibilities of unrecognizing situations and also to maintain high secure this system make use of three biometrical features.

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