BIO-METRIC AUTHENTICATION OF A PERSON USING DYNAMIC GESTURES

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Abstract

Objectives: In modern world the need of identification is most important due to increase in security system. So we prefer biometric authentication for ATMs, buildings and other restricted sources.

Methods/Statistical Analysis: Based on previous biometric work here we propose multiple and more biometric authentication like dynamic mouse gesture, recognition of face, recognition of hand gesture and verification of dynamic signature.

Findings: Identifying an individual is known as personal identification. Authentication elements like ID cards or passwords can be stolen, but biometric authentication is more secure and cannot be stolen by anyone as its behaviour differs from person to person. This method is has vast application and can be used in our laptops or mobiles.

Applications/Improvements: To reduce the issues of authentication it presents the efficient utilization for the methods of biometric authentication.

Keywords: Component behavioural biometric, Mouse dynamics, Mouse dynamics analysis framework, Data Acquisition, Data Pre-processing.

1. Introduction

Biometric based, knowledge based and token based are three classifications of person identification. Identifying a person using PIN or password is knowledge based identification. Identifying a person by means of Driving license, passport or other identification cards is referred as token based identification. In two mentioned methods there are several disadvantages like token can be stolen, misplaced, lost or may not be remembered. Also in knowledge based thin there is demerits like PIN or password can be misused by someone if he get to know the users authenticated PIN or password. Biometric is the new and trending way for the secure authentication. Biometric identification works on the behaviour of individual person and also this aspect will vary from person to person as it maintains it individuality.

So it is the more secure way to use biometric authentication method instead of using traditional methods like knowledge or token based authentication. An the other aspects we can mention is the misuse of the token like any one can login by using stolen password or PIN, also a person may login using others ID card. But biometric authentication needs the physical presence of the person i.e. for finger print recognition, face recognition, palm print recognition etc. So biometric authentication system.

Can establish more secure way that too combining the multiple biometric authentications will lead to more secure than single authentication system. Also biometric system cannot be handover to someone and also cannot be stolen or misused. Meant for the various application areas, authentication of the consumer along the biometric will be secured very highly.

In[1] proposed a structure for meeting requirements for private sector in retail. More and tests are repeatedly perform on the basis of forgeries & signatures that are authenticated that produce some inaccurate output from 1.5% - 4%. It is important to note the verification of the biometric detection and its error rate as authentication must be done accurately.

In[2] proposed in his work that CPN (Counter propagation neural network) which has high efficiency in recognizing handwriting recognition. This work proposes more accuracy than other neural network methods. This wok motivates in developing more accurate hand recognition system.

In [3]used SVM classifier for more accurate recognition of signature verification using offline method. Training of number of signatures was done to detect the accuracy of the system and tests were conducted to detect the system. It uses artificial neural network for the training and support vector machine for classifying the signature offline. Database of the registered user is stored and will be compared with the user using SVM classifier and detects the authentication of person.

In[4] proposed new technique for hand recognition system in real time constraint. In low dimensional and noise free space signature space of data glove is linearly projected in this system using PCA for the handwritten recognition.

In[5] proposed a system for the off line and static signature verification of the system. This is done in manual method that is signature is made on paper and it will be verified manually using some segmentation methods. Static signature method can be easily identified.

In[6] proposed in this system that dynamic signature recognition has more advantageous over static signature recognition and the research work can be done both on line and off line recognition can be done. This shows that the

real-time recognition can be done and it gains some importance as face, iris and fingerprint authentication can be carried out.

In[7] submitted some survey work on different types of authentication and identification. He referred the use of biometric method identification over some traditional method identification like token based and knowledge based. Also described that biometric is secure way for identification as it uses physical presence of person and individual behaviour of person. He proposed a system called Gait which has some advantages that is it can provide good result and also can be efficiently utilizes for far distance recognition.

In[8] represent recognition of 3D face with usage of occlusion. This helps in efficient face recognition as better segmentation will be done in 3D face recognizer.

In[9] states some of the problems in hand gesture recognition and states that hidden markov model can be considered for the posture or hand gesture for efficient authentication in real time.

In[10] combine features of MLP and some combinational feature for real time hand gesture recognition.

1. Proposed Method

Security is the main aspect and is used in universities, industries and other places where more confidential thing is maintained and current existing system exhibits some of the disadvantages like cost, performance, maintenance, solution, accuracy etc. in existing system chance of breaking security is high even though it may be biometric. To overcome this here we propose some new authentication and combination of multiple authentications are used. Hand gesture recognition, face segmentation, mouse gesture recognition and signature verifications are some of the recognition methods that we propose in our system. Single biometric authentication can be broke using some modern ideas, so here we propose the combination of multiple gestures like hand gesture, face recognition, online signature and dynamic mouse gesture for doubling the authentication. 3D three dimensional domains have advantages over 2D recognition to avoid variation in expressions, illuminations caused in the system. 3D face recognition works in real time and robustness is high. As we are intending to do some economic operation, the technique is simple and in expensive. 3D recognition overcomes the disadvantages of 2D face recognition. In 3D recognition of system we do segmentation of face images and different features for face identification is described. Hand gesture recognition follows some simple steps in identifying person and steps followed here are image capturing, pre processing, feature selection and final classification. After the classification is done it will be verified. Here we make use of accelerometer and reliable identification of people can be done. Hand gesture system uses accelerometer to draw

gesture in air. Signature verification system is important aspect and here we proposed system for online signature verification system and also for verification of the system robustness is required. Tablets that are digitized and even pens which are special which is related for PC using USB is required for this system. Data is been put in storage of database of the signature as signature will be considered as pen strokes which consists of coordinates of x, y, z. The system we utilize mixed network along angle, density of energy as well as features that are directional. High accuracy output can be obtained from this system compared to existing system. Also a system is developed to draw designs on computer using mouse for dynamic recognition and data is extracted from that and used for identification purpose.

1. Result and Discussion

This section gives detailed information about our experimental work and results

i. Face segmentation method

User face is captured using camera during registration in this approach. Mouth, eye and nose part is segmented as image is captured and will be stored in database. User will be authenticated if and only if his face matches with original captured image. Figure 1 and Figure 2 shows the user interface for whether the user id authenticated or unauthenticated. Also result images have been displayed.

Figure-1. Face capturing, while registration for User.

Figure-2. Authentication for correctly recognized.

ii. Mouse gesture dynamics method

The user will be allowed for drawing any gesture in this approach and the written gesture will be kept inside the database. While there is requirement of authentication user will be enquired for drawing gesture and if gesture matched then he will be treated as authenticated user or else it will declared as unauthorized person. Result images for registration and verification phase is shown in Figure 3 and Figure 4.
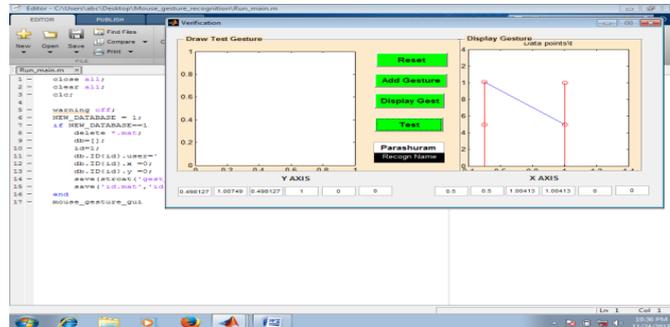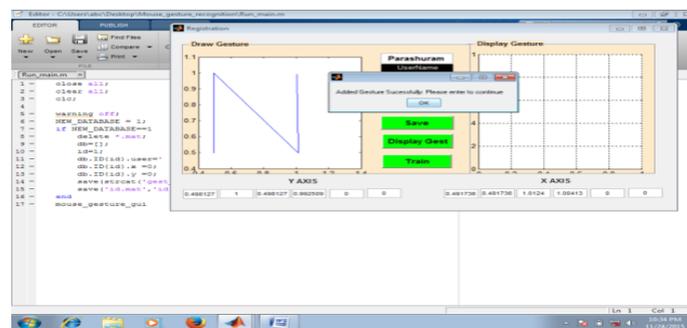

Figure3. Adding gesture for user name.

Figure4. Recognizes authenticated user.

iii. Hand gesture recognition method

Here user's gesture will be matched to gesture stored in the database that will be previously drawn by the user during the time of registration. If both the gestures are matched user will be then declared by way of user who is authenticated in case of any mismatch among the gesture then user will be acknowledged as user as an unauthenticated. Figures 5 and Figure 6 shows authentication of person using hand gesture.
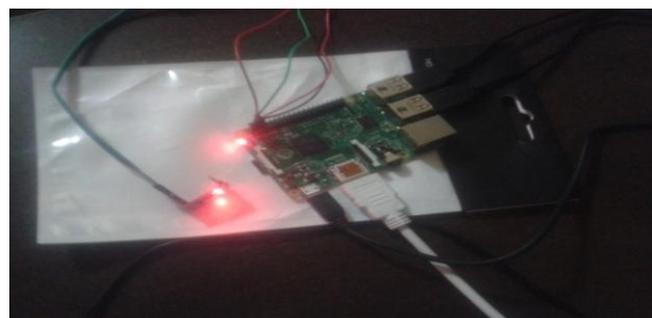

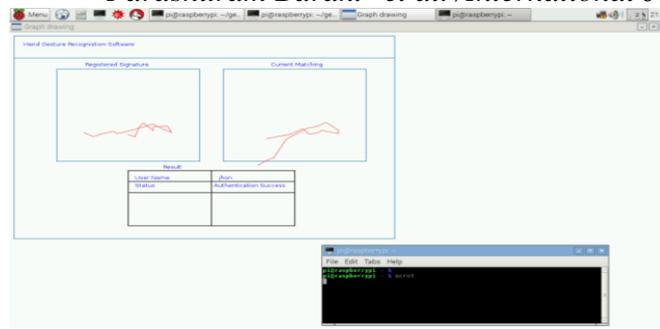**Figure-5. Hand gesture device that comprises the accelerometer for drawing gestures.**

Figure-6. Authentication will be successful& user will be "John".

iv. Online signature method

In this approach user is allowed to draw signature on pad and it will be stores in database during the registration. At the time of verification if user signature matches then he will be declared as authenticated user else it will show him as unauthenticated person. The Figure 7 to Figure 10 shows experimental results.

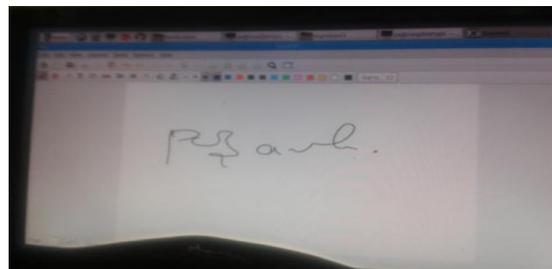**Figure7. Device used for capturing online signature.**

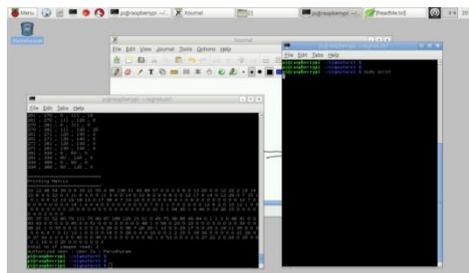**Figure8. Written signature will be displayed on the screen.**

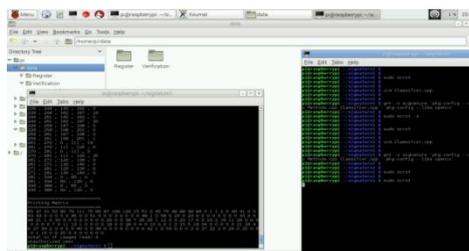**Figure9. User will be authenticated as Valid User.**

Figure10. User is considered as unauthorized User.

Conclusion

As the approach we make use of combination of any two biometric authentication methods like dynamic mouse, hand gesture and dynamic signature recognition for the purpose of authentication. This research work assures in bringing economic and more secure authentication method for users.

References

1. Thomas G, Zimmerman Z, Gregory G, RussellF, Andre   A, HeilperH, Barton A Smith, Jianying Hu. Retail applications of signature verification. In Proceedings of SPIE - The International Society for Optical Engineering. 2007,pp.1-9

2. ZafarMF,   Mohamad D, Rizab   R,   Othman M. Online Handwriting Character Recognition: An Implementation of Counter propagation Neural Net. Word Academy of Science Engineering and Technology. 2007, 1(10), pp. 3278- 3283

3. EmreOzgunduz, TulinSentrurk, ElifKarslgil M. Off-Line Signature Verification and recognition By Support Vector Machine.Signal and Image Processing (ICSIP), 2014 Fifth International Conference on.2014 Jan, pp. 3-8.

4. ShohelSayeed, S. Andrews, RosliBesar, Loo Chu Kiong. Forgery Detection in Dynamic Signature Verification By Entailing Principal Component Analysis. Hindwai Publishing Corporation. 2007 Oct, 2007, pp.1-8.

5. TahuraBijapure, SuchitaRane, Sumaya Shaikh, Fatima Anees Ansari. Dynamic Signature Recognition. International Journal of Engineering Research & Technology.2013 Sep, 2(9), pp.1-3.

6. Nitya Raj, DishaDawani, Harshit Singhani, Utkarsh Mishra. Signature Verification – A Biometric Authentication System.ITSI Transactions on Electrical and Electronics Engineering. 2013, 1(1), pp.91-93.

7. Sruthy Sebastian. Literature Survey on Automated Person Identification Techniques.International Journal of Computer Science and Mobile Computing. 2013 May, 2(5), pp.232-237.

8. NeseAlyuz, Berk Gokberk, LaleAkarun. 3-D Face Recognition Under Occlusion Using Masked Projection. IEEE Transaction on Information Forensics and Security.2013 May, 8(5), pp.789-802.

9. KapuscinskiT, Wysocki M. Hand Gesture Recognition for Man-Machine interaction. Second Workshop on Robot Motion and Control. 2001 Oct, pp. 91-96.

10. Yu C, Wang X, Huang H, Shen J, Wu K. Vision-Based Hand Gesture Recognition Using Combinational Features. IEEE Sixth International Conference on Intelligent Information Hiding and Multimedia Signal Processing. 2010 Oct, pp. 543-546.