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An Optimal and Smarter Recognition Pattern Based on Eigen Visual Perception

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Abstract: **Biometric**- ***Biometrics is defined as the computerized recognition of individuals based on their behavioural and biological characteristics. It is a developing technology. Biometric authentication devices use unique traits or behavioral characteristics, such as fingerprints and voice recognition, to authenticate access to electronic assets. Because biometric information is unique to each person, fingerprints scans, for example, are an excellent way to ensure that the identification of users is sophisticated and complex enough. Unlike the use of other forms of authentication, such as passwords or tokens, biometric recognition provides a strong link between an individual and a claimed identity.One area where biometrics can provide substantial help is in guarding against attempts to establish fraudulent multiple identities or prevent identity fraud.***

Keywords: Uml/class diagram, Data flow diagram, Test Case, Test Result

1. Introduction

"Biometric authentication is effective way to prove identity."

By searching through the stored references, individuals who appear to have previously enrolled using a different identity can be highlighted for further investigation. It is very difficult to perform this type of check without the use of biometrics.

2. Biometrics Represent The Future of Electronic Security

In an increasingly digital word, protecting confidential information is becoming more difficult. Traditional passwords and keys no longer provide enough security to ensure that data is kept out of the hands of hackers and unauthorized individuals.

1) User authentication needs to be more sophisticated as the IoT world gets larger. Having a plethora of devices that rely on passwords for authentication makes them susceptible to hacking and unauthorized access because human error is always a very real possibility. Also, with all the smartphones, tablets, cloud-based services and sensors continuously sending and receiving information, the chance of breach is multiplied exponentially.
2) Companies today are also realizing the benefits of biometric devices for protecting server rooms, work computers and other business assets. In a corporate environment, organizations need to make sure that unauthorized individuals are not allowed into secure systems.

A biometric system is fundamentally a pattern recognition system that recognizes a person by determining the authentication by using his different biological features i.e. Fingerprint, retina-scan, iris scan, hand geometry, and face recognition are leading physiological biometrics and behavioral characteristic are Voice recognition, keystrokescan, and signaturescan.

3. Face Recognition

Face is a complex multidimensional structure and needs good computing techniques for recognition. The face is our primary and first focus of attention in social life playing an important role in identity of individual. We can recognize a number of faces learned throughout our lifespan and identify that faces at a glance even after years. There may be variations in faces due to aging and distractions like beard, glasses or change of hairstyles.Face recognition is an integral part of biometrics. In biometrics basic traits of human is matched to the existing data and depending on result of matching dentification of a human being is traced. Facial features are extracted and implemented through algorithms which are efficient and some modifications are done to improve the existing algorithm models.

Computers that detect and recognize faces could be applied to a wide variety of practical applications including criminal identification, security systems, identity verification etc. If a face is recognized it is known or the system may show a similar face existing in database else it is unknown. In surveillance system if a unknown face appears more than one time then it is stored in database for further recognition.

4. Eigen Face Approach

It is adequate and efficient method to be used in face recognition due to its simplicity, speed and learning capability. Eigen faces are a set of Eigen vectors used in the Computer Vision problem of human face recognition. They refer to an appearance based approach to face recognition that seeks to capture the variation in a collection of face images and use this information to encode and compare images of individual faces in a holistic manner. The Eigen faces are Principal Components of a distribution of faces, or equivalently, the Eigen vectors of the covariance matrix of the set of the face images, where an image with N by N pixels is considered a point in N2 dimensional space. Previous work on face recognition ignored the issue of face stimulus, assuming that predefined measurement were relevant and sufficient. This suggests that coding and decoding of face images may give information of face images emphasizing the significance of features. These

features may or may not be related to facial features such as eyes, nose, lips and hairs.

5. Existing Technology

This basically deals with the problems of different real world users, and also provides appropriate solution to their corresponding problems. The problem deals with recognition of a number of faces and identifies that faces.

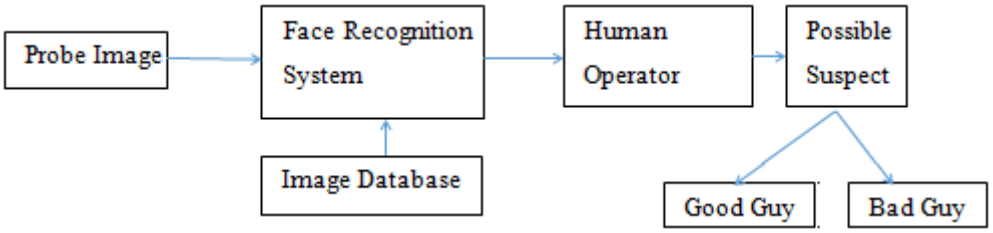

Figure: Face recognition working

The overview is for creating an interface which intend to identify user faces using Visual Studio. The application uses encoded in C# programing language. Facial recognition technology (FRT) has emerged as an attractive solution to address many contemporaryneeds for identification and the verification of identity claims. It brings together the promise of other biometric systems, which is attempt to tie identity to individually distinctive features of the body, and the more familiar functionality of visual surveillance systems.

6. Hardware And Software Requirement

Hardware and Software requirements are those which are essential to implement the working of this technique and these are:

6.1 Hardware Requirement

Microsoft Visual Studio is an integrated development environment (IDE) from Microsoft. It is used to develop computer programs for Microsoft Windows, as well as web sites, web applications and web services. Visual Studio uses Microsoft software development platforms such as Windows API, Windows Forms, Windows Presentation Foundation, Store and Microsoft Silverlight. It can produce both native code and managed code.

Minimum Requirements:
1) Computer that has a 1.6GHz or faster processor
2) 1 GB (32 Bit) or 2 GB (64 Bit) RAM (Add 512 MB if running in a virtual machine)
3) 3GB of available hard disk space
4) 5400 RPM hard disk drive
5) DirectX 9 capable video card running at 1024 x 768 or higher-resolution display
6) DVD-ROM Drive.

6.2 Software Requirement

The software required for Android development is free and readily available on the Web:
1) Visual Studio 2010
2) .NET FRAMEWORK 4

6.3 Research Design

"An Optimized and Smarter Face Recognition Using Eigen Visual Perception" is developed in C#, which mainly focuses on basic face recognition operations. It is a C# application written for biometric devices &systems, designed to help users to identify a person through its face. The software has 4 main modules.

- Face Detection and Available face
- Add Faces and Names
- Train Faces
- Display Information

Face Available and Detection: -Used to show the Available faces that are already exist.

Add Faces: -This option is used to create a new details of person in which we have to insert:

- Person Image
- Name Of Person
- Account Holders

Train faces: - Option provided to store a Face Pattern based on Eigen values. It contains:-

- Face Patterns
- Mean Face

Display Information: -It provides the details of Person identified by its face and also provide its name.

6.4 System Design

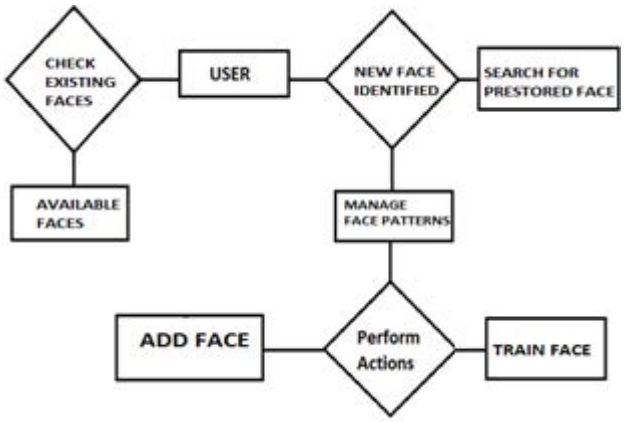

Figure: ER Diagram for adding a face

6.4 UML/CLASS Diagram

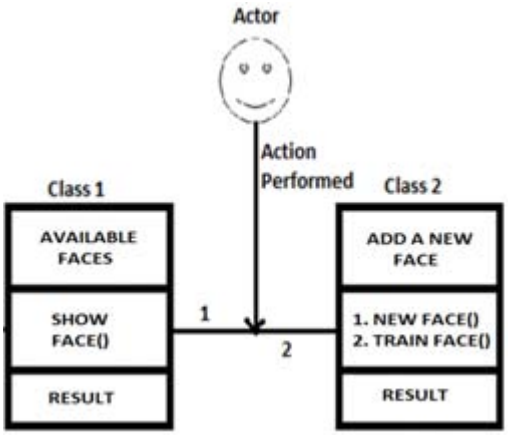

Figure: UML/Class Diagram of adding a face

7. Development Tool and Technology

7.1 Flow Chart

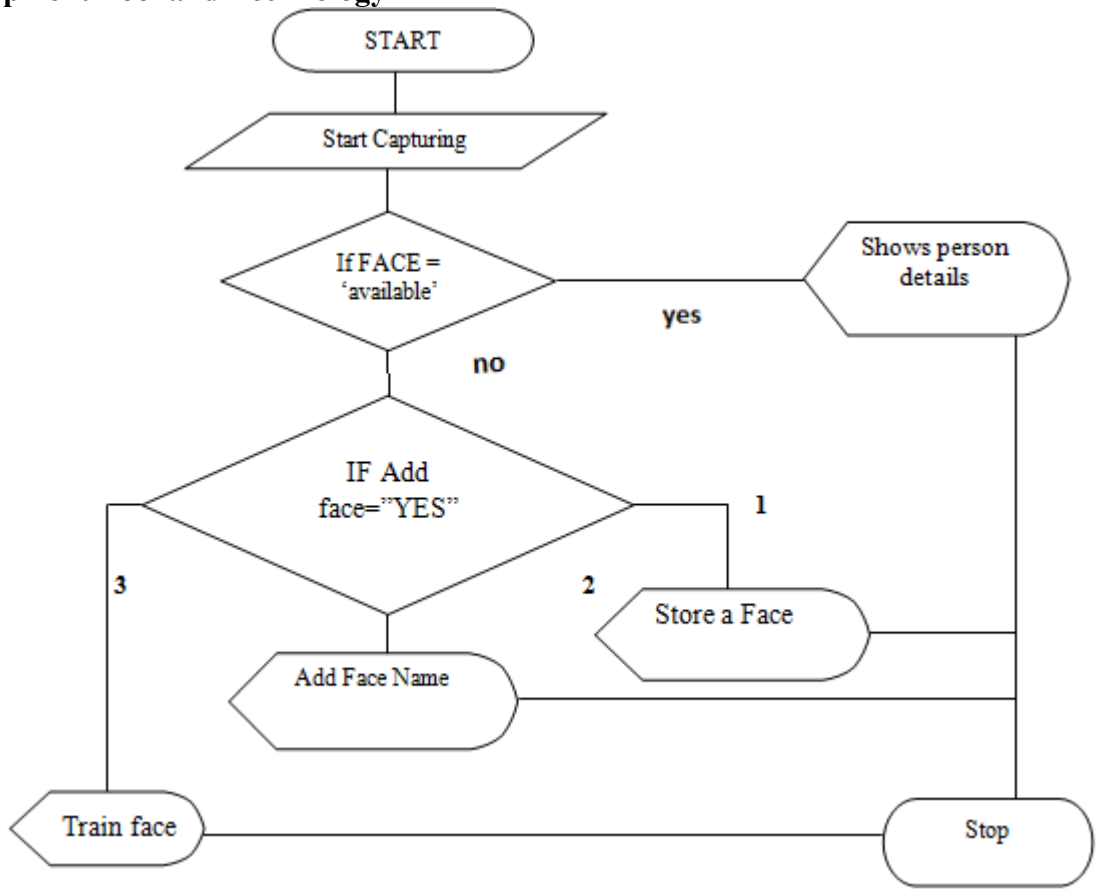

Figure: Flow chart of proposed work

7.2 Detailed Design

Data Flow Diagram

Design Notations

Notation used in design follows DFD (data flow diagram) and ER diagram (Entity relationship diagram).Some notations are:

i) Level 0 DFD

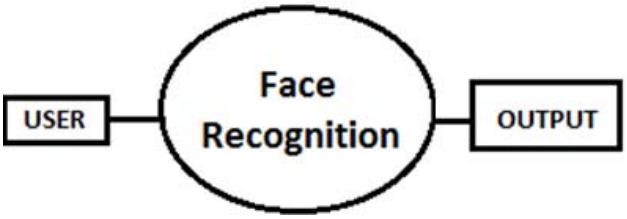

Figure: Level 0 DFD of face recognition.

ii) Level 1 DFD

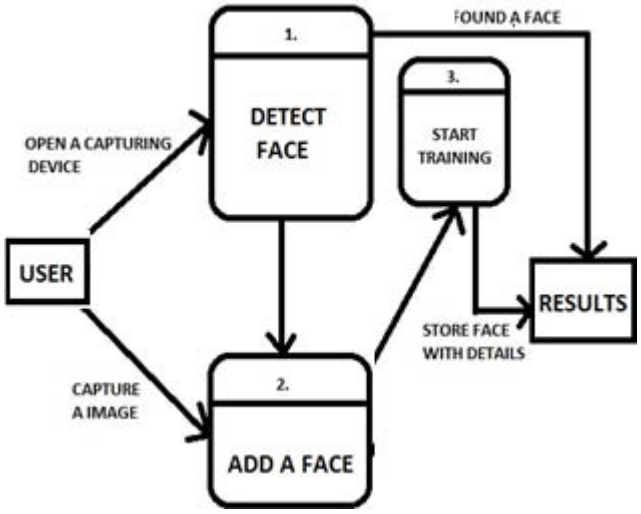

Figure: Level 1 DFD of detect or add a face

iii) Level 2 DFD

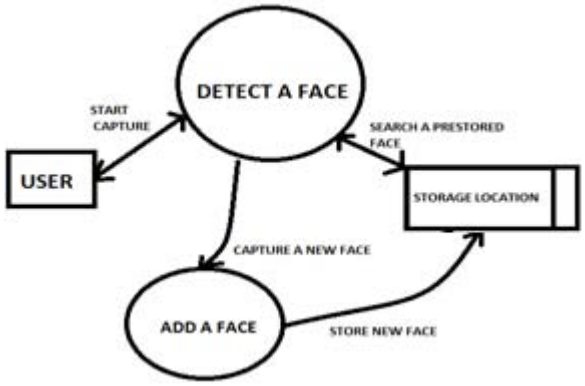

Figure: Level 2 DFD of detect a Face

iv) Level 3 DFD:-

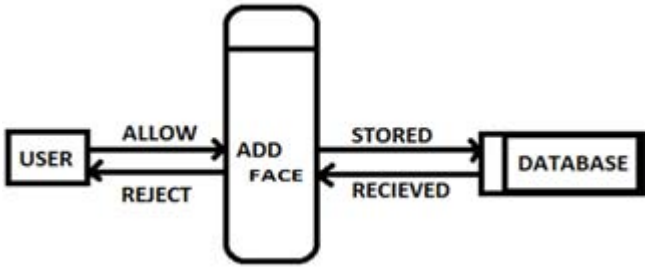

Figure: Level 3 DFD of add Face

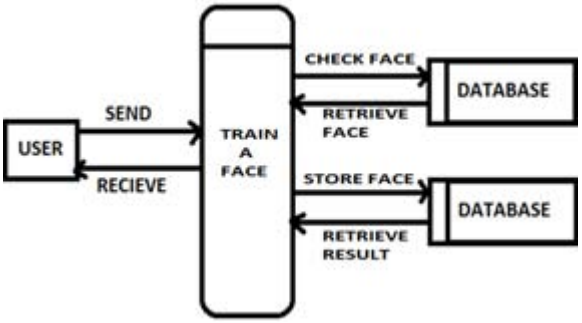

Figure: Level 3 DFD of train a face

8. Result and Discussion

This "an optimized and smarter face recognition Using Eigen visual perception" Test Report provides a summary of the results of test performed as outlined within this document. Testing is the practice of making objective judgments regarding the extent to which the system (device) meets, exceeds or fails to meet stated objectives. There are two fundamental purposes of testing: verifying procurement specifications and managing risk. First, testing is about verifying that what was specified is what was delivered: it verifies that the product (system) meets the functional, performance, design, and implementation requirements identified in the procurement specifications. Second, testing is about managing risk for both the acquiring agency and the system's vendor/developer/integrator. The testing program is used to identify when the work has-been "completed" so that the contract can be closed, the vendor paid, and the system shifted by the agency into the warranty and maintenance phase.

Test Summary

- **Test Case1:** Connect a Device
- **Test Case2:** Detect and Recognize
- **Test Case3:** Add a face
- **Test Case4:** Start Recognition

Test Result

- Program is compatible for the given OS.
- No Error Found.
- Having Easy and Fast Interface.

Output

Basic Interface

When a device is not attached and shows person Count = Nobody in the seen.

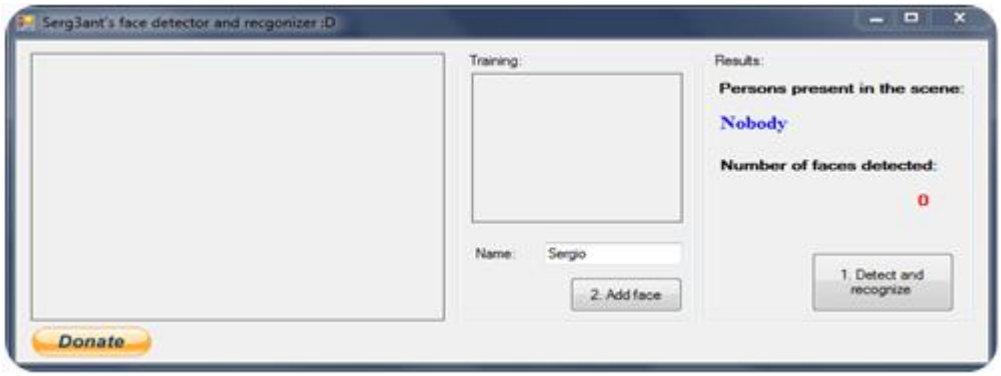

Figure: First output screen

Detect a Face

Figure: Face detection starts up and detect no. of faces.

Training on a Face:

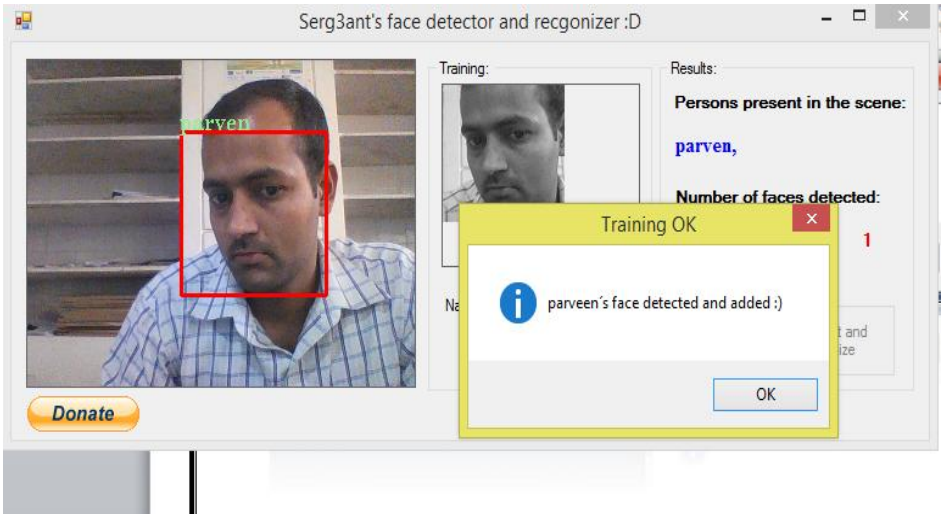

Figure: Saving a person face with its name.

Identify A Face

Figure: Next time when capture a previously stored face it starts providing its details

9. Conclusion

Three-dimensional face recognition is a modality of facial recognition methods in which the three dimensional geometry of the human face is used. It has been shown that 3D face recognition methods can achieve significantly higher accuracy than their 2D counterparts, (rivaling fingerprint recognition) by measuring geometry of rigid features on the face. This avoids such pitfalls of 2D face recognition algorithms as change in lighting, different facial

expressions, make-up and head orientation. Additionally, most 3D scanners acquire both a 3D mesh and the corresponding texture. This allows combining the output of pure 3D matchers with the more traditional 2D face recognition algorithms, thus yielding better performance.

The main technological limitation of 3D face recognition methods is the acquisition of 3D image, which usually requires a range camera. Alternatively, multiple images from different angles from a common camera may be used to create the 3D model with significant post-processing. Recently commercial solutions have implemented depth perception by projecting a grid onto the face and integrating video capture of it into a high resolution 3D model. This allows for good recognition accuracy with low cost off-the-shelf components.

References

[1] Pentland, A., Picard, R., and Sclaro_, S., Photobook: Tools for Content-Based Manipulation of Image Databases," SPIE Storage and Retrieval of Image and Video Databases II, No. 2185, San Jose, Feb 6-10,1994.
[2] Reisfeld, D., Wolfson, H., and Yeshurun, Y., Detection of Interest Points Using Symmetry,", ICCV '90,Osaka, Japan, Dec. 1990.
[3] Turk, M., and Pentland, A., Face processing: models for recognition," Intelligent Robots and Computer Vision VIII, SPIE, Philadelphia, PA, 1989.
[4] https://www.technologyreview.com/s/535201/the-face-detection-algorithm-set-to-revolutionize- image-search.
[5] BabackMoghaddam, Gregory Shakhnarovich, “Images of faces, represented as high-dimensional pixel arrays;” TR2004-041, May 2004.
[6] J. Rymel, J. Renno, D. Greenhill, J. Orwell and G. A. Jones, "Adaptive eigen-backgrounds for object detection," Image Processing, 2004. ICIP '04. 2004 International Conference on, 2004, pp. 1847-1850 Vol. 3.
[7] S. Lawrence, C. L. Giles, Ah Chung Tsoi and A. D. Back, "Face recognition: a convolutional neural-network approach," in IEEE Transactions on Neural Networks, vol. 8, no. 1, pp. 98-113, Jan 1997.
[8] Z. Qian and D. Xu, "Research Advances in Face Recognition," Pattern Recognition, 2009. CCPR 2009. Chinese Conference on, Nanjing, 2009, pp.