Automated Digital Authentication based on Facial Recognition

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Abstract—**The advancement in image processing techniques made better computer vision. This computer vision is used for authentication and authorization of different entities at different places. Digital authentication done by UID verification is now used at different level for customer identification. Face recognition is totally based on image processing technique. This processing completes in two steps: Verification and Identification. The pre processing is done to optimize image quality while is removes noise. The post processing is done for feature extension and pattern matching. The availability of efficient hardware and advanced software's is possible to uniquely identify human being. So this research proves the availability of finger print technology is successful in India.**

Keywords—*Digital Image Processing, Face Recognition, Face Matching;*

I. INTRODUCTION

The face recognition is an approach making technique which is used to detect any face or any stored data for security purpose and provides best service to detect any kind of suspicious activity. The most adopted method to recognize any people or any living thing is face detection. It's used in various intelligent services likes, intelligent robot services, identification services. This technique is very hard to know the user recognition exactly. [1] Due to the illumination and distance real environments entity are disturbed and their outcomes are not perfect. Mainly the distance between user and face recognition system is changed instantly to the time. So the outcomes are very difficult to obtain the effective match. Face recognition system used the overall recognition rate, so the outcomes of the face recognition control the overall recognition rate. To increase the recognition rate we must accurately extract the face from the background. Face recognition is divided into two groups: - Feature-based approaches and Shape-based approaches.

One of the feature-based approaches use skin colour information defined in the CIE Lab colour space. Although it takes advantage of color information, it is affected by illumination. These methods are easy to implement and detect faces rapidly with simple operations. However, they do not consider many variations of face images. Statistical approaches use neural networks [4], statistical distributions, and Adaboost. Viola and Jones [3] suggested a face detection method using the Adaboost algorithm. To get a good result, they need a huge dataset of face and non-face images for training the detector.

It is a very critical problem that the intelligent service robot can know family to provide the service. The most common method to recognize people is face detection. This recognition technique is difficult to cover the user recognition perfectly since the real environments include the variations likes illumination and distance. Especially the distance between user and robot is always changing. Generally, the home service robot mounts the low resolution camera, the more a distance between a robot and a user become distant, it is very difficult to obtain the good result by common adaboost face detection methods. Normalized Cross Correlation (NCC) is used to detect the exact face in the low resolution face image. The reference face image was obtained through the statistical way using detected face images by adaboost. We used appearance-based face recognition techniques such as eigenface and fisher face for the face recognition experiment.

II. DIGITAL AUTHENTICATION BASED ON FACIAL RECOGNITION

3.1 Face Detection

General face recognition researches concentrate on the recognition methods that distinguish the classes using the variety algorithm in a pattern classification point of view. When these algorithms are used in a fully- automatic face recognition system, then the faces are not manually extracted. We adopted face detection algorithm based on Adaboost. In the pre-processing step, revised modified census transform (RMCT) is adopted to offset sensitivity to the changes of pixel values. In the face detection step, difference of pyramid (DoP) images coupled with a two-dimensional logarithmic search is used for fast face detection [6].

3.2 Face Image Registration

The automatic face detection process involves finding the face, locating in it some features and based on these, geometrically normalizing the face to match some template. This is the face registration process [7]. Face image registration from a detected face image is one of the most important bottlenecks for stable recognition system. Especially, intelligent robot environments include the varying distance and

changing lighting condition in accordance with place. Adaboost face detector finds numerous different sized variants from the one face image, even if that image has only one person. For the face image registration, we have to normalize face image based on position of face components. We adapt the face component detection algorithm that is able to detect face components from face images under size variation, complex background, and skew angle variation. This algorithm has several steps for the face component detection algorithm. The first step is an adaptive sobel edge detection algorithm and the second step is a 2-pass labelling algorithm.

III. FACIAL RECOGNITION METHOD

In the early 70's the face recognition technique is runs on 2D pattern. To recognise the face here we used two major property (a) face denoted points and (b) distance between points. But it is necessary that the face recognition systems to be fully automatic. It's a challenging and very interesting problem who is working in different research fields like psychology, pattern recognition, neural networks, computer vision, and computer graphics. [2] These following methods are used to face recognition.
1. Holistic Matching Methods
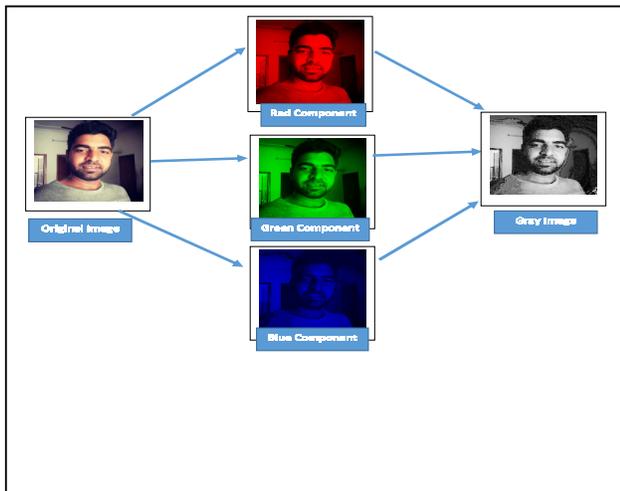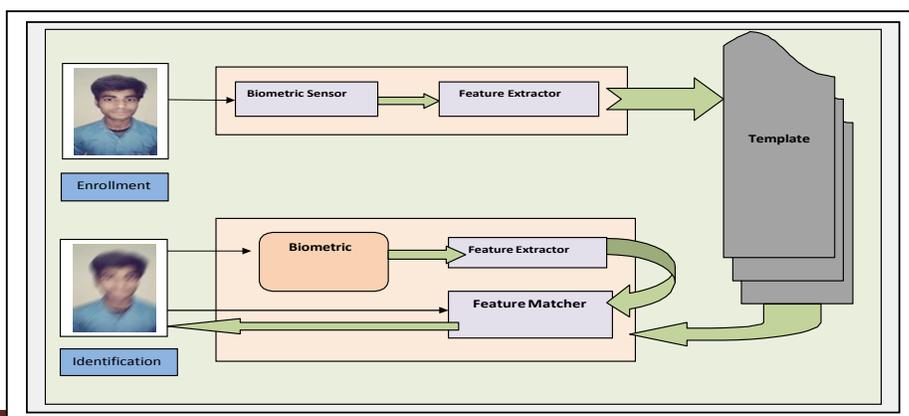2. Feature-based (structural) Methods
3. Hybrid Methods

Fig. 1. Color Component Extraction from Face Image.

Fig.2 Basic Technique used to recognize the Face

IV. FACIAL RECOGNITION

A. Analysis of Face

Practical analysis of face image is totally an image processing task. Image as input is applied to the algorithm which first applied pre processing operations to make input image to use for experiments. Pre-processing operations are binarization, filtering and finding ROI (reason of interest). Face is the amalgamation of bones, skin and muscles. Contract of these muscles are produced deformed facial features. Facial feature are acts as a rapid signal that varies according to their acts and their effects. Eyebrows, eyes, lips cheeks are affected the recognition accuracy and skin color, gender, age is affected the rapid signals. [2] [3]

B. Applications of Facial recognition

Face recognition is also useful in human computer interaction, virtual reality, database recovery, multimedia, computer entertainment, information security e.g. operating system, medical records, online banking, Biometric e.g. Personal Identification- Passports, driver licenses , Automated identity verification- border controls, Law enforcement e.g. video surveillances, investigation, Personal Security- driver monitoring system, home video surveillance system. [3]

TABLE 1
Recognized Application of Face Identification [2]

S. No.	Areas	Applications
1.	Biometrics	Drivers' Licenses, Entitlement Programs
		Immigration, National ID, Passports, Voter Registration
		Welfare Fraud
2.	Information Security	Desktop Logon
		Application Security, Database Security, File Encryption
		Intranet Security, Internet Access, Medical Records
		Secure Trading Terminals
3.	Law Enforcement and Surveillance	Advanced Video Surveillance, CCTV Control
		Portal Control, Post-Event Analysis
		Shoplifting and Suspect Tracking and Investigation
4.	Smart Cards	Stored Value Security, User Authentication
5.	Access Control	Facility Access, Vehicular Access

C. Technique use for Face matching

V Conclusion

The conclusion of the research work is the simple solution to the authentication problem in different area of processing is possible through the face recognition. Face Recognition is an image processing technique which is dependent upon the facial features extracted by image processing operation applied on the practical image. This research is basically presents the importance of face recognition in Human Authentication. The security and information record management is easily possible through face identification, all the services are require human to be identified through the examine their face.

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