FILE SYSTEM AUTHENTICATION USING SEQUENCE OF IMAGES AND EIGEN EDGINESS TECHNIQUE

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***ABSTRACT** : Face Recognition Systems have been playing a vital role from several decades. Face detection and recognition is challenging due to the Wide variety of faces and the complexity of noises and image backgrounds. We want to develop and deploy a system which primarily focuses on Enhanced Independent Component Analysis for the Content Based Face Image Recognition. . various algorithms for Face Recognition are developed for various applications like 'person identification', 'human computer interaction', 'security systems'. This method detects the static face (cropped photo as input) and face from group photo and these images are compared with training data set which retrieves the persons' details accordingly. Image pre-processing is used in order to reduce the error rate when there are illuminated images. To compare the training images with the real time images, we would be using canny edge detection algorithm in fusion with Eigen Edginess method, so that authentication can also be done for video based security breaching also .The purpose of software will be that, the user should be able to secure the data using facial recognition and should be able to access the same data over the network safely and securely. The user should secure data at the server side and access the same secured data from the client side over the wired network with a better and simpler UI. Also with an efficient time and space complexity as compared to presently existing Systems.*

Keywords – Canny Edge Detection, Eigen Edginess, Fusion, Training data, Content Based Face Image Recognition.

I. INTRODUCTION

Faces represent complex, multidimensional, meaningful visual stimuli and developing a computational model for face recognition is difficult. This paper describes a system for File Security by using an image sequence and subsequently doing Eigen Analysis over a training dataset of images to minimize the overall error rate and enhance the accuracy level. Face detection and recognition are challenging tasks due to variation in illumination, variability in scale, location, orientation (up-right, rotated) and pose (frontal, profile). We propose a new approach to automatically classify facial features and carry system authentication so as to minimize the system overhead. First, we detect facial features namely: eyes, eyebrows and mouth using vertical and horizontal projections. Next, we segment facial features using active contour since it gives more close and natural representation of the detected feature shape. Afterwards, we extract relevant facial features points which define the prominent landmarks surrounding facial components. This is an improvement over the manual annotation method for Facial Characteristic Points (FCPs). Then, we have defined a set of distances so as to measure facial features deformation. Eigen analysis of edginess representation of face is used for face recognition. One dimensional processing is used to extract the edginess image of face. The face recognition is carried out by cumulatively summing up the Euclidean distance between the test face images and the stored database, which shows good discrimination for true and false subjects. We can identify at least two broad categories of face recognition systems: **1**. we want to find a person within a large data-base of faces (e.g. in a police database). These systems typically return a list of the most likely people in the database. Often only one image is available per person. It is usually not necessary for recognition to be done in real-time.

2. We want to identify particular people in real-time (e.g. in a security monitoring system, location Tracking system, etc.), or we want to allow access to a group of people and deny access to all others (E.g. access to a

building, computer etc.) [Multiple images per person are often available for training and real- time recognition is required. The recognizer provides a measure of confidence in its output and classification error approach is almost zero while rejecting as few as 10% of the examples. We use a database of 400 images of 40 individuals which contains quite a high degree of variability in expression, pose, and facial details.

II. RELATED WORK

Facial expression recognition methods can be categorized in two main approaches: Feature approach and Global approach.

A. Feature Approach

These methods are also known as geometric methods or local feature methods. They recognize facial expressions using a set of facial features such as eyes, eyebrows and lips. This broad category of feature approach encompasses three minor subcategories of methods: model-based methods, contour-based methods and optical flow based methods.

1) Model-based methods

These methods describe facial features using different associated models. Although eyes, mouth and eyebrows are the most dominant features, the detection of these facial features differs from one method to another. Pantic and Rothkrantz proposed an Integrated System for Facial Expression Recognition which defines a geometric face model. This model uses points to represent the face in frontal view and 10 points to describe the face in profile view. The goal of such frontal and profile combination is to increase the face model quality. Edwards et al. proposed a new mechanism to extract active appearance model parameters independently of head pose and facial expressions. Therefore, they used Mahalonobis distances based classifier on a set of training images. The main limitation of model-based methods is the complexity to fit the model on the face due to interpersonal different facial expressions. Accordingly this adjustment leads to high computational cost.

2) Contour-based methods

Contour-based methods give good approximation of the salient facial features shape. The process of facial expressions recognition relies on specific points of interest extracted from facial feature contours. Hammal used parametric deformable models to automatically extract the contours of each facial feature and then built a skeleton of facial expression. Using this skeleton, she defined five distances which describe the six basic facial expressions. Relying on Hammal characteristic distances, some authors have used measures of similarity between the given expression and the neutral expression. A set of rules was defined using these measures to build similarity matrix where matrix rows represent the neutral expression of each face and columns represent the six basic expressions. Nonetheless, it has been observed that significant confusion errors arose between different facial expression classes.

3) Optical Flow based methods

These methods detect facial movements using motion temporal video information. Most of these methods have used Optical Flow analysis to recognize facial expressions. Yacoob and Davis represented face movement using optical in order to identify the six universal facial expressions. Their approach is based on tracking some face regions and computing optical flow of points whose intensity gradient is high. Using a set of well-defined rules, this representation is classified into one of the basic facial expressions. In order to build robust recognizing facial expressions system independent of head pose, Black and Yacoob presented new approach based on parameterized model and local optical flow technique. Rigid head movements were analyzed using an approximate planar face. Then a refined model curves were used to model features movement (eyes, eyebrows and mouth). In their approach, the head and facial features regions were selected manually and then automatically tracked. Nevertheless, optical flow-based methods do not discriminate between the optical flow caused by facial features movement and those produced by noise.

B. Global Approach

Global methods rely on a training phase wherein different artificial techniques, such as Neural Network and Support Vector Machines, can be applied. Actually, global methods Perceives face as a global entity whose characteristics and deformations are learned. They require some prior knowledge about the face structure and are typically based on pixel information or general face data. These data may be encoded as a color vectors, gray scale pixel motion vector or sequence responses of different filters (Gabor Wavelets). In order to classify human facial expression, Padgett and Cottrell used "back propagation" neural network. The principle of learning is to provide a set of example as an input to the network and set the output to the required value. As input, they used 7 blocks of pixels normalized by PCA (principle component Analysis) technique. These blocks are extracted from eyes and mouth regions. Regarding the output layer, it involves seven units; each one corresponds to specific facial expression class. Although these methods are simple and yield important recognition rates, their main drawback is their sensitivity to image illumination variation which affects face appearance.

III. PROPOSED SYSTEM

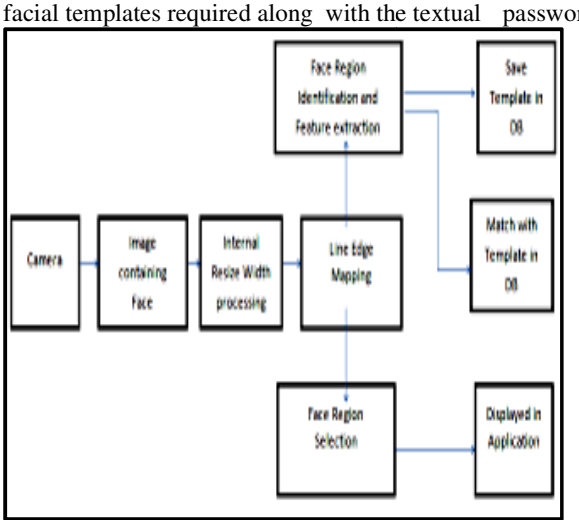
The software being developed will be working on a network. The network will be wired network. The main

purpose of this system is to secure the data while on the network and the user will be flexible to access the data independent of its location.

The primary benefit of this system is the security level provided to it. The data is protected with the help of fuzzy vault which works on the principle of difficulty in reconstruction. There is no need to remember the password once entered to secure the data. Entering only one biometric template while accessing data will be sufficient. This product will become user's first choice because this system will secure the crucial and confidential data staying at the systems along with data transferring from the network. As well as the user also will be authenticated before providing access to the data once registered. This product will provide a better GUI for the user to interact with the system.

This product will be acknowledged for its high quality performance due to its lowest response time. Using the GUI he/she will be able get their facial coordinates captured. Processing will be done to secure the data at the registration stage. The fuzzy vault will be created at the same location where the data is stored. Then while accessing the data either from the same system or from different system entering only one biometric template will be sufficient. So there is no need to remember the password. This system will be securing the most confidential data. This system will be working with lowest response time.

The main functions for this system will be registering and accessing data between which the user authentication will also play major role. In each functions sub-functions will be there. Feature extraction, canny edge detection, binary mapping, vault creation, save vault, fusion, hamming distance etc. will be the sample sub-functions and facial templates required along with the textual password.



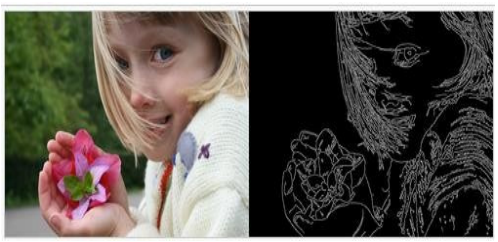
Overview of the proposed technique

Algorithms: Eigen Analysis:

Is where we generate the Eigen faces. Eigen Faces is nothing but more generalized version of a facial metrics. To do so we begin with the set of faces from database and calculate the average face and the adjusted matrix for the particular set of images organized in an entire column. We then compute the Covariance matrix of the resultant matrix using its transpose and perform PCA on the resultant matrix for Eigen analysis. We then compute the first and second vector from the covariance matrix to get the individual Eigen faces.

Canny Edge:

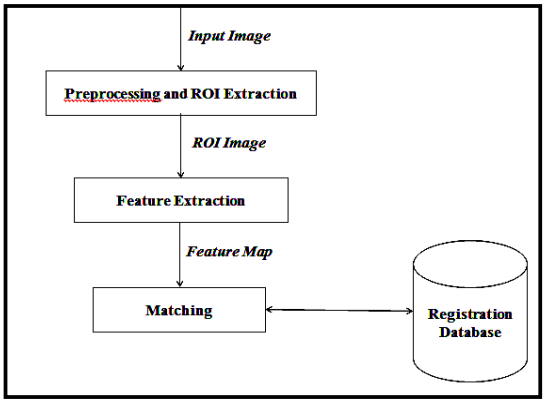
The canny edge detection algorithm filters the entire image into sharp edges by determining the sharp changes in the different intensities within the image. It is often accompanied by Gaussian filter, Intensity gradient and double threshold.



Canny edge applied to a picture

Feature Extraction:

This is the phase where an image is taken as input for preprocessing and extraction of the Region of interest region (ROI) and feature extraction is carried out.
These facial features are then mapped by the images in the registration database to gain access.



IV. CONCLUSION

In this paper we presented a face detection and localization technique in a video. To speed up the process of face detection, motion information is used, and probable eye pair regions are extracted, which guides the template matching for face verification.With this approach, scanning the image for different scales and orientation is avoided. In our method Eigen analysis of edginess representation for face is used for recognition along with a fusion module of canny edge Detection Algorithm. For each subject, 30 face images are captured from the video, and the face is recognized based on minimum cumulative sum of the Euclidean distances, which gives better performance than the distance from a single face image. Relying on data mining robustness, we have used these distances to generate a set of relevant prediction rules able to classify effectively facial Coordinates and distances between them. Nevertheless, the performance of our approach can be further improved by integrating other more precise active contour technique to extract accurately facial features shape. This being so, we intend to conduct further studies on more different facial expression databases.

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V. REFERENCE

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