International Journal of Multidisciplinary Research and Development

Volume: 2, Issue: 9, 729-732
Sep 2015
www.allsubjectjournal.com
e-ISSN: 2349-4182
p-ISSN: 2349-5979
Impact Factor: 4.342

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Biometric Authentication for Online Examination

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Abstract
There are many biometric authentication methods such as face, finger print, iris, hand, veins, keystroke, signature, voice based authentication. Among that face recognition based research has been chosen under cost and time consuming factors.
The main objective of the face recognition research is to recognize a sample face from a set of given authenticated student faces in order to provide more security. Principle component analysis (Eigen face approach) is applied to recognize a student face that is a face under different lightening and emotional condition. For comparison and experimental analysis simple approach such as user name and password based authentication and finger print based authentication are used. The final result is analysed and the face recognition method produces best result. The present invention of face recognition based authentication involves two phases such as, face detection which is the primary process and face recognition which is an authenticating phase.

Keywords: Hough Method, Face Color Information Method, Adaboosting method, Normalization, Normalization, Neural Network, Eigen Face Approach

1. Introduction
Face detection involves four main concepts. Firstly, face localization which separates parameter space and object space using Hough method and skin color information method. The Second step is face normalization which extracts only the face by discarding all the surroundings. Third step is to locate facial characteristics using neural network. Finally the student face is extracted using Eigen face approach. After extracting the features of the face, all these features will be basically stored as a template that will be used for recognition. In recognition phase, the student face is captured and checked for authentication. Only if the face matches with the store template the student will be allowed for the examination.
Like single face recognition multi face recognition system uses principle component analysis (PCA) technique. To perform PCA five steps to be undertaken. The first step is subtracting the Mean of the data from each variable. The second step is calculating and forms a covariance Matrix. The third step is calculating Eigenvectors and Eigen values from the covariance Matrix. The fourth step is to choose a Feature Vector. Final step is multiply the transposed Feature Vectors by the transposed adjusted data.
Automatic skin detection is a common primitive for a range of human related image processing applications, one of which includes face detection. Pixel level skin searches can be very rapid and can greatly reduce the search space prior to higher level classification. Thus such detections are often used as front-end primitives to higher level person and face location system. Complexity reduced face detection using probability-Based face mask pre filtering (Hough method) and pixel-Based Hierarchial Feature Adaboosting (face color information method) is used to detect the face is used because the training time is significantly reduced and the detection rate remains competitive to the traditional Adaboosting method.
It is an effective Eigen face approach and the implementation is straightforward. The simplicity and computation efficiency make this approach an excellent candidate for real-time surveillance system. Multi Face Detection system provides a solution that can automatically detect faces in still images and real time video feeds. The system can detect an arbitrary number of faces at any scale and location. The system takes photographic images or a video stream as input. The output consists of an array of rectangles which corresponds to the location and scale of faces detected. If it detects no faces, it will return an empty array.
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2. Technical Overview

This paper consists of two modules.

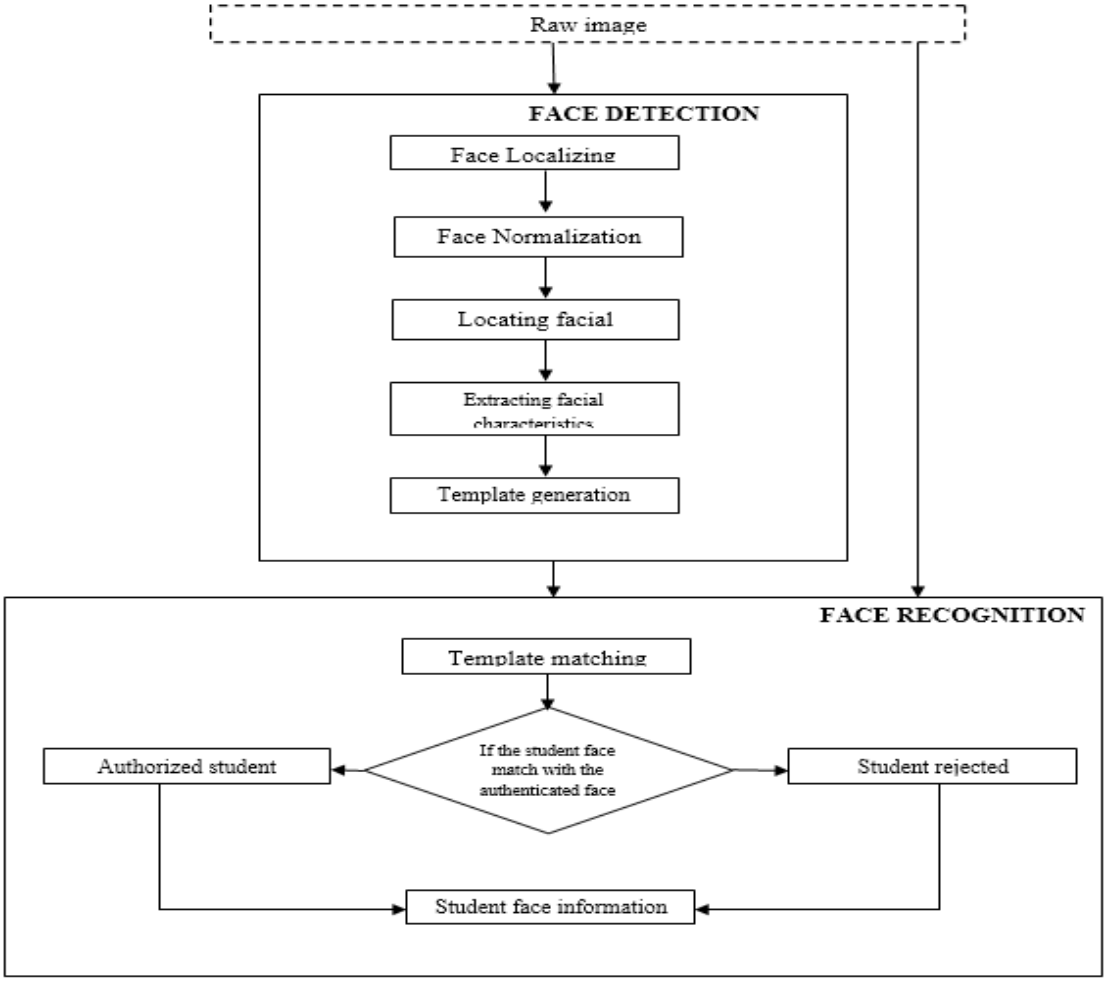
- Face detection (and)
  - Face localization
  - Face normalization
  - Locating facial characteristics
  - Extracting facial features
- Face recognition

(i) Face Detection

Face detection which is the primary process and face recognition which is an authenticating phase. Face detection involves four main concepts. Firstly, face localization which uses Hough method and skin color information method. Second, face normalization which extracts only the face by discarding all the surroundings. Third concept is, locating facial characteristics using neural network. Finally extracting the student face using Eigen face approach.

(ii) Face Recognition

After extracting the features of the face it will be basically stored as a template that will be used for recognition. In recognition phase same process of face detection is carried out and verifies whether the student is really authorized or not.



a) Data Flow of Biometric authentication

(iii) Methodology based on: Generation of Probability-Based convolution Face Mask Skin segmentation
Pixel-based face mask and probability.

Automatic skin detection is a common primitive for a range of human-related image processing applications, one of which includes face detection. Pixel-level skin searches can be very rapid and can greatly reduce the search space prior to higher level classification. Thus such detectors are often used as front-end primitives to higher level person and face location systems. The starting point for the following approach is assumed to be a colour image represented in the RGB colour space. The RGB space is known to be susceptible to intensity variations.

K – Training positive images X1 of size M x N

(iv) Generating probability table p(x,y,GreyValue)
In most practical applications the RGB GreyValue space is quantised to 8 bits per colour, giving a discrete 3-D space of dimension 2^{24}. It is feasible to create a probability map covering all of these sixteen million-or-so pixel values, the main practical obstacle being the availability of a suitably large, labelled database. The distinct advantage of such a map is the computational speed with which a pixel can be tested: the discrete RGB values become a co-ordinate address in the probability map, resulting in an almost instantaneous pixel classification.

With the sample of 24 x 24. i=l.....k;

(v) Integrating face mask – Convolution Approach D(x,y)sq/kmeans(xi(x,y)-M(x,y))2/k
Integrating face mask approach applies knowledge-based rules to intensity images, which are known for their sensitivity to changes in lighting conditions. This leads to non-faces being picked up in complex backgrounds that have similar intensity distributions to human faces. The approach adopted here, directly extends Integrating face mask work by utilising the additional information present in colour images. Skin segmentation is performed as a pre-processing step; only those image regions containing appropriate quantities of skin are considered for further processing.

3. Recommendations for future research
The system has been designed and developed according to the current requirements of the user. At the same time the system is very flexible and extensible, Hence, future enhancements, if needed can be made without much difficulty, so new applications can be developed and it be integrated with the existing one very easily.
The following future enhancements may be worthwhile to make the tool usable to a wider section of users.

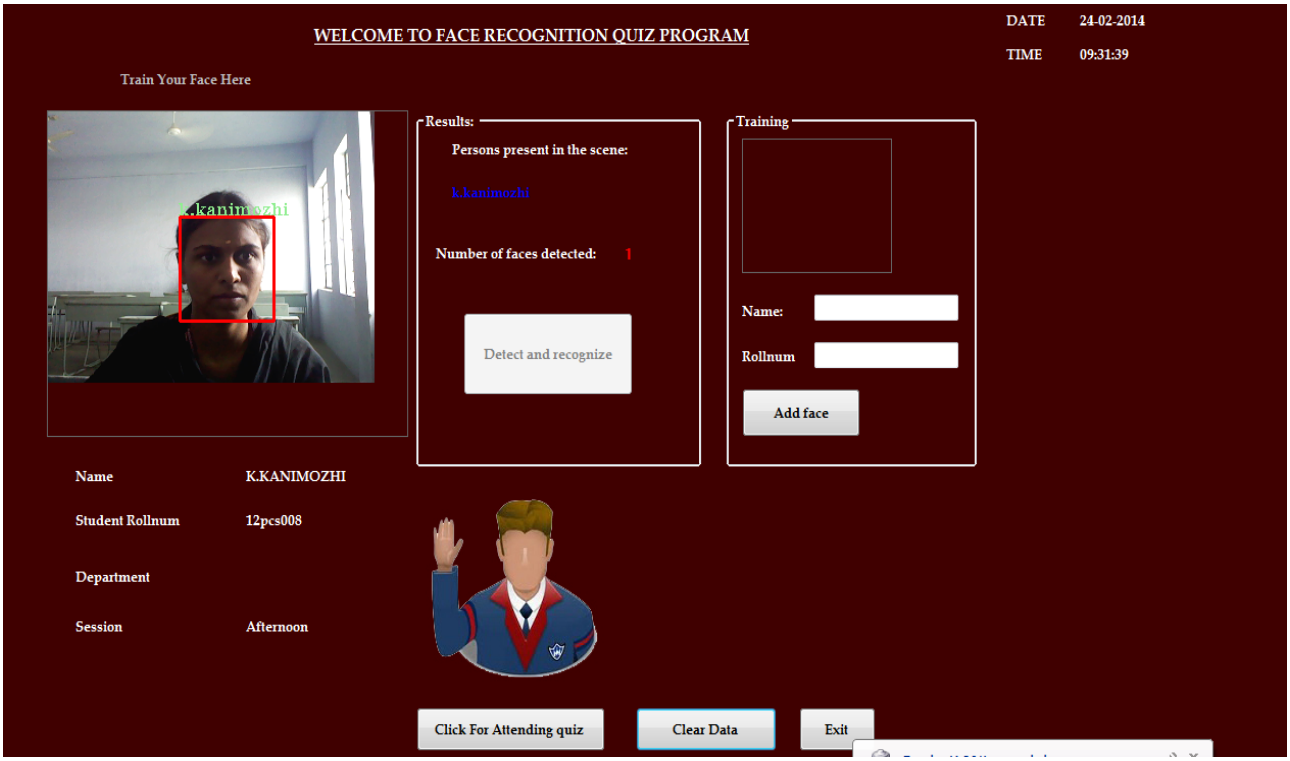
- Multi biometric authentication such as veins, hand, fingerprint, iris, voice, signature and keystroke based authentication can be implemented simultaneously for better security
- The user can enhance the software by using the tabs like banners, images, movie files, by the multicolored frames.

4. Analysis and discussion
The aim of the system study is primarily to understand the problem. The study of present system is through available documentation such as procedures, manuals, documents and the interview of the user staff and onsite observations.

(i) Feasibility of face recognition
System analysis is the process of examining a business situation for the purpose of developing a system solution to a problem or devising improvements to such a situation. Before the development of any system can begin, a project proposal is prepared by the users of the potential system and/or by systems analysts and submitted to an appropriate managerial structure within the organization.

(ii) Existing system
The existing system is full of manual process. Manual system maintains the limited number of transactions and storing the data's is very difficult. The existing system is found time consuming and complex procedure. It is difficult to get the details of all the particulars. Lots of paperwork is involved and human efforts are needed in the manual system. Record storage is irregular. This system is time-consuming and risky.

(iii) Proposed system
The main objective of the proposed system is to reduce time and make the system more user friendly, efficient, accurate and fast processing. It reduces the manual work and confusion occurring by maintaining files. The details of the transaction are added to the table automatically. The proposed system facilitates the admin to minimize the work load. More facilities can be added in future work.



5. Conclusions

The existing system is full of manual process. Manual system maintains the limited number of transactions and storing the data's is very difficult. The existing system is found time consuming and complex procedure. It is difficult to get the details of all the particulars. Face recognition based biometric system overcomes the difficulties and provides more security. The currently developed multi face recognition system has its high scope compared to single face recognition and it is found to be working accurately. It is tested for its effectives, flexibility, accuracy and user friendly. The system is found to be delightful running under the single window system. The programming techniques used in the design of the system provides a scope for further expansion and implementation of any changes which may occur in future. The system has been tested with all sample data covering all possible options for each function. Its performance is satisfactory the system is under implementation.

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