

“Developing Photograph recognition Application to be used for Medical, Immigration and Police Purposes”

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Abstract

Face recognition systems have gained wider acceptance rate in the security applications like the Broader Agency in verifying the individuals. With the huge developments of the digital technology, photographs are used in the recognition process rather than the original human faces. Motivated by this concept, this project mainly aims in developing a photograph based recognition system that accepts input in the form of image and tried to perform the recognition process based on this input image. In this project Eigen face algorithm is used to recognise the human faces based on the presented input image. Through questionnaire, the need and the importance of this photograph recognition system is being identified. The design and the development of this photograph recognition system are done such that it is applicable for medical, immigration and the police applications. The effectiveness of this developed system is identified through proper testing methods.

Keywords: Face recognition systems, Eigen faces, Questionnaire, Photographs

Chapter 1 Introduction

1.1 Introduction

With the drastic developments in the digital technology, digital cameras have evolved to a greater level and are also being widely used by the people. Also the high utilization of social networking sites like face book made people to take photograph to a great extent and to share them with the other people. Using the present technological digital cameras high clarity photographs can be obtained through which the facial features of the individuals can be easily identified. These photographs are not only used to share with the friends and relatives, they are also being used for the purpose of recognizing criminals. Because of the huge increase of criminal activity it has become very crucial to develop security mechanisms which can identify the convicts not only based on the actual face but also based on the photographs (Khanna,N; 2014). Photograph recognition system is the system that can be used for the security application to recognize the required person based on the photographs.

This photograph recognition system can not only used in recognizing the criminal but also used for the authentication purposes. As most of the secure locations consist of CCTVs, they will be able to collect the images of any criminal activity in a clear manner. The use of current technology in this CCTV can further help in obtaining high clarity photograph. This photograph will be stored in the database and will be used to recognize the actual culprit. In the authentication systems a photograph sample will be stored in the database and when a person needs to be authenticated; his facials features will be compared with those present in the photograph. When there is similarity between these features the user will be authenticated otherwise the user will not be unauthenticated (Jhing-Fa Wang, 2008). The successful working of this photograph recognition system can make it to be used in highly sensitive applications like biometrics as they help in providing high recognition and also authentication techniques for the defensive applications and the border agency applications.

The successful working of this photograph recognition system requires appropriate analysis of the photograph and to extract the features form the photograph in an appropriate manner. If the extraction process is not appropriate then the technique that is used to recognize the individuals will not be effective (Sang-Woong Lee and Raiz, S., 2013). In this project photograph recognition system is designed and implemented using java platform. The photograph analysis technique that is used to analyse the facial features of the photograph is Eigen face method.

1.2 Problem Statement

With the increase in the technology, multimedia data has become the main source for communicating the required information. The use of photographs to recognise a victim or a culprit has increased to a great extent. Here the recognition process will be done only when the photograph that is taken is compared with the photographs that are stored in the database. Such type of the recognition system has got huge importance in the real time applications of medical, health and immigration. Despite of the availability of the large number of these recognition systems, there is a lack of the appropriate one which is cost effective and flexible (Ali, R; Zakariya, S.M and Lone, M.A., 2011).

In this project a photograph recognition system is designed in which the taken photographs are compared with the ones stored in the database. This application will be designed in such a way it is highly applicable for the medical, immigration and the police applications.

1.3 Aim

The crucial aim of this project is to perform the photograph matching process in a secured and efficient manner with the help of Eigen face method.

1.4 Objectives

The main objectives of this project are listed below:

1. Identify the main importance of the photograph recognition system and the advantages that are offered by this method.
2. Design the photograph recognition system that is applicable for the medical, police and the immigration applications.
3. Design the Eigen face method to recognition the faces based on the presented photographs.
4. Implement the designed system with the help of the java software.
5. Test and evaluate the system to improve the quality of it.

1.5 Methodology

Rapid application methodology is extensively used in this project. The use of this methodology helps in completing the project in an effective manner and also quickly by collecting the requirements, designing, implementing, testing and finally evaluating it.

1.6 Software Specifications	<p>Software: Java + Oracle Form 6i</p> <p>Language: Java</p> <p>Database: Oracle 10G</p>
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Chapter 2 Literature Review

2.1 Introduction

In the recent time the field of face recognition has gained intensive research with its application in the highly security fields. In the present world there is a high need of security where government organizations and the other business organizations need highly reliable techniques for identifying the individuals in an accurate manner without causing any damage to the privacy rights of individuals and also recognizing the individuals in an effective manner. With the help of the proper recognition system an appropriate solution can be provided for this issue. In the literature large number of techniques is present to implement an efficient face recognition system. These techniques come either under template matching methods or under feature matching methods. In the technique of feature matching the various features of the face are segmented and the descriptive information will be obtained from them like the width and the height for these measures ratios will be taken and then will be preserved in the server side database. These ratios taken for each person will be used to compare one individual with that of the other individual. Template matching is the category which is based on non segmentation. In this method every face will be considered in the form of two dimensional arrays and comparison will be performed with that of the other kind of facial arrays (Lone et al, 2011). In some techniques the human faces are considered in the form of points and the equidistant distance is being calculated between these faces. Some methods like principle component analysis, linear discriminate analysis are being used to reduce the burden of recognition process and also without affecting the accuracy of the recognition. Neural network model is the other technique which comes under the existing methods of recognition. In this method the system will be provided with an image training set and the correct classification through which the neural network will be able to recognize each

image in an appropriate manner. Deformable template is the method in which template development is take place for identifying the particular regions that are crucial in the image (Kanzawa, 2008). This template will be placed over the image and the template will be deformed automatically so as to fit to the required object.

In this project a recognition system is provided based on the photographs are images that are presented. The recognition system that is provided in this project is based on a client server architecture where the main database will be present at the server and the actual image to be recognized will be present at the client.

2.2 Existing Work

This section presents a clear view of the face recognition system which is the existing work that is done in the human recognition field. The various image analysis methods that are present are described in this section (Boregowda, L.R; 2013).

Face Recognition System

Facial recognition system has become one of the commonly used biometric methods to identify the human beings and to authenticate them. The facial features of each human being will be different which has acted as the main idea in developing face recognition systems. The initial recognition methods were using simple models of geometry which was not effective in producing the appropriate results. The facial features that are used to distinguished one individual with the other are the distance between the eyes, distance between nose and mouth etc (Khalid, M; 2007). The first face recognition system is developed in 1960 in which the administrator is required to locate the required features like eyes, mouth, nose and ears. However with the huge developments in the technology, highly sophisticated face recognition systems are being developed using which the face recognition process can be done automatically. On the other hand these face recognition methods require the human beings to be personally present at the recognition process.

Analysis of faces

For face recognition system it is required to adopt algorithms which can analyses the different facial features. In literature three main image analysis techniques are present namely PCA (Principal Component Analysis), LDA (Linear Discriminate Analysis) and EBGM (Elastic Bunch Graph Matching).

The commonly used image analysis method is PCA where Eigen faces are utilized. When this analysis method is used both the sample image and the actual image that is taken should be of the similar size. Initially the normalization process should carry out where the eyes and mouth of both the images will be placed in a line. Using this technique the data dimension will be later reduced with the help of data compression method and then the facial features will be represented in a highly efficient way with the help of low dimensions. This way of reducing the dimensions helps in removing the unwanted data and forms the face structure into Eigen faces. Every image of the face will be stored as the weighted sum related to the Eigen faces in an array (Sang-Wong Lee, 2013). During the process of recognition or authentication the comparison between the images will be done where the distance that is present between the different feature vectors will be identified. In this technique it is highly required to present the complete face at each time of the recognition process; otherwise it can result in inappropriate results.

Linear discriminate analysis is the statistical method in which the samples related to unknown classes will be classified using the samples of known classes. This technique is mainly aimed in increasing the variance between two classes and in decreasing the variance with in a class. When the facial data is of higher dimensions then this method face an issue of smaller sample size as the number of transmitting samples that are available will be less in comparison with the sample space dimensionality.

The third image analysis method is the elastic bunch graph matching method which is completely based on the aspect that several non linear characteristic are present with the facial images that are not dealt by linear analysis techniques. In this method construction of a graph will be done by identifying the visual cortex from the human faces. Graphics will be constructed based on different dimensions of the faces at all the

different angles. These constructed graphics specified the distance between the eyes, distance between eyes and mouth, distance between nose and chin etc. This technique requires the utilization of appropriate landmark localization methods that can be obtained when it is combined with the other methods like PCA and LDA (Jhing-Fa Wang, 2008).

Photograph Recognition Method

The system model of photograph recognition model is presented in this section. This system consists of a user terminal and a server machine which interact with each other to complete the recognition process. The user terminal will be accessed by the users and the server consists of the data base from which several photographers are stored. The photograph recognition method will be developed in this project in the form of a web based application. This application will be running on the user terminal. This application can accept the user photograph that consists of images for the process of recognition. Initially extraction of the image from the photograph will be done and this extracted image will be registered with the database. Later a pass image will be set by the user terminal for the image that is stored in the database (Koike, H., 2006). This image which is extracted from the photograph can be stored as it is or can be extracted from the photograph and can be stored. Later the process of authentication and recognition will take place after which a notification will be provided by the server to the terminal machine.

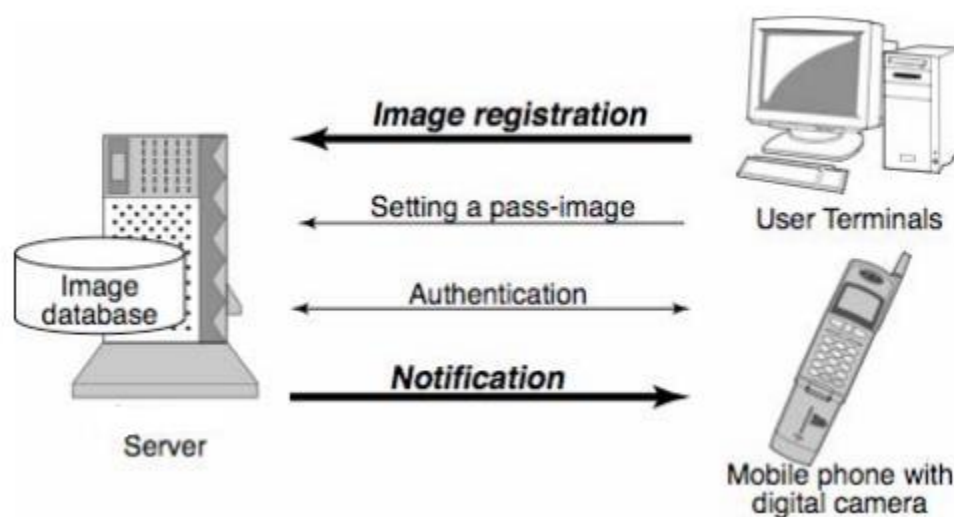


Figure 1 Four steps involved in photograph recognition process (Koike, H., 2006)

The complete procedure including all the four steps involved in this photograph recognition process is shown in the above figure. In the notification provided by the server, the matching score between the presented image and the image stored in the database will be given.

2.3 Multivariate Analysis

Multivariate analysis is regarded as the important field of statistics that is mainly aimed to study the various random systems having more than a single random variable in it. This multivariate analysis is a broader area that offers several tools to solve large number of problems. In the problem of face recognition different tools are present under this multivariate analysis. These tools are (Weitao et al, 2009)

1. Nearest neighbor classifier
2. Principle component analysis
3. Linear discriminant analysis
4. Probabilistic based principle component analysis
- 5.

1. nearest neighbour classifier

The nearest neighbour classifier is the communalised paradigm for the pattern recognition. In this paradigm the faces can be recognize from the images if the system know the faces accurately. In this method facial images will be considered as the vectors which contain gray level values related to the different image pixels. The close relation between the vectors will be identified by measuring the Euclidean distance between these vectors. Even though this idea of nearest neighbour classifier is simple, it involves high cost of computation when the distance between the vectors is high. This computational cost increases when the large number of training data sets is present. On the other hand this method is greatly affected by even small variations present in the transmitting and also in testing applications (Viswanathan, 2009). The main reason for this is due to the use of complete facial image instead of just extracting the features from it.

2. Principle component analysis

For the problem of face recognition, principle component analysis is a widely used solution and is commonly referred as Eigen faces. This method takes the property of radiance that is present in training set so that the faces can be represented in a highly remindful and also in a better manner. All the vectors will not be placed in the training set but only those which linearly represent the training data and from which the reconstruction of the images can be done or kept in the vectors. The vector consists of training set along with the collection of Eigen faces. The image expansion into training set is very optional where a minim level of Euclidian distance is guaranteed between the images. The obtaining of Eigen faces is done as the Eigen vectors related to the training set. A statistical interpretation will be present in the Eigen vectors as they specify the orthogonal access through which the main reasons of variability of the training set can be explained. The Eigen values related to these Eigen vectors consider the cause of variability in each Eigen vector. The Eigen vectors which points to the correct variation of the change in training data consist of higher level of Eigen values when compared to that of the Eigen vectors that point to the unrelavant causes. Using these Eigen faces a compact representation and the meaningful representation of the human faces will be represented (Orzechowski, 2011).

3. Linear discriminate analysis

Linear discriminate analysis also varies the main criteria in obtaining the goals. During the vector projection into a very less dimensional space, the images which are related to the same subject will be closer when compared to that of the images related to the different subjects. The mathematical formulation that is used for Eigen values and the Eigen vectors is same as that of the principle component analysis. In this method two matrices are considered of which one is within class and the other one is between class metrics.

4. Probabilistic based principle component analysis

This analysis method extends the principle component analysis method by specifying that the distribution of the vectors that specify the images is based on multi variety Gaussian. For every Gaussian the estimation of the mean is done in the form of calculating the mean image related to the data set of the particular subject. The convergence metric can be estimated in an appropriate manner by using various images for every subject. To overcome this problem the same covariance metric can be used for all Gaussians (Lucas, 2010). In case of the Eigen faces the covariance metric size is large where the complete data is not used for estimation but only the principle components are used for estimating the covariance metrics.

2.4 Design goal of face recognition system

The main design goal in designing a recognition system for the photographs is to offer a human computer interface that is user friendly and also effective in nature. Some of the main design goals that must be stratified by this recognition system are automatic nature, robustness, real time and modularization (Julia, 2013).

1. Automatic Nature

The recognition system must have the capability to recognize the photographs that are presented to it and which are in the region of interest for the system. In case of identifying the appropriate human face related to the presented photographs, this system should be able to present the results in an automatic manner.

2. Robustness

The recognition systems for the photographs will be mainly used in the applications either indoor or outdoor. In most of the applications the work environment will be complex which requires the recognition system should be highly robust so that it can adopt the surroundings and can able to recognize the photos that are present in it any condition.

3. Real Time

The recognition system that will be designed should be able to recognize the photographs in the real time applications. For this purpose a proper algorithm along with a structured design process must be adopted while designing and also implementing the recognition system.

4. Modularization

The recognition system must be able to work according to the design rules. Based on this feature the recognition system that will be designed and implemented can be updated or expanded in a very easy manner.

2.5 Photography recognition technology

The technology of photograph recognition system works in the following manner. Initially the registration of a specific subject will be done to this system. For the registration the photography related to this subject are required and there must be more than one photograph for each subject. The presented photographs will be processed by the underlying algorithm to evaluate the quality of the photographs, to identify the key landmarks in the photograph like the position of the eye, position of the nose, distance between the eyes. The photograph will be future processes depending on the landmarks positions for the creation of a canonical image. Later the crucial biometric features will be extracted from this image for creating reference templates. In this reference template the information which the algorithm treats useful for identification will be presented and the size of this template can be ranging from 100 bytes to nearly 5 kilo bytes. Based on the application type the capturing of the photographs will continue till the system feels that the reference template is formed with good quality (Stephen, 2011). The main impediment for the performance of an efficient biometric system is the absence of poor quality control in this process of registering the photographs into the recognition system. Later the live photographs related to the new subject will be captured and the same processing step of above will be undertaken to precede a live template for this new subject. In the process of matching the live template will be compared to that of the reference template stored in the database where match score will be calculated. This match score indicates the similarity degree that is present between the two photographs. This match score will not be understood easily to the end user and will be interpreted by the system to produce the end result as either match, not match or probable match (Stephen, 2011).

When the registration of the photographs is completed into the recognition system, the actual process of the photograph recognition will take place. In the recognition mode, when a new subject comes into play it will claim as the specific identity. The photographs of new subject will be considered and will be compared with that of the client identify photograph. This comes under the verification process in which the confidence level of the subject that it has claimed will be identified. In case of identification the unknown subject will present its photographs without any claiming. Photographs will be taken and then will be compared to all the records in the database. In this process the match score will be presented

and the type of match will be given to the end user. This is a one too much comparison based application and also takes more amounts of time and resources. In this application the recognition system adopts the identification task in which the match score will be presented (Stelvio, 2011).

2.6 Requirements of the recognition system

In the present day several recognition systems are present. The existing systems mainly concentrate either on computer security market and on the government based identity based applications. In the application related to computer security access to the specific resources will be controlled to the process of identity verification of the photographs that are presented. The photograph inputs are taken which are inexpensive and are required to be highly tolerant in the variations in the quality of the images. The systems related to these applications work in the indoor lighting applications where human supervision will not be present. In case of the government based identify applications several requirements will be present. The input images should be of high quality and with proper lighting. However the systems for these applications must be designed to deal with a large number of images and should work for very long period. The main requirement that must be satisfied by a recognition system for the real time applications is given below (Borko, Furht, 2006).

1. Low Template Ageing

In most of the real time applications of the recognition system the photographs will be presented several times in a year. There would also be some specific photographs only during particular time of the year. The recognition templates must be highly valid where the template ageing should be less.

2. Wider pose of photographs

Even though the biometric systems are greatly justified, they require the use of the plain and clear background for the photographs. However, this provision of the natural and the clear environment will not be possible at all the situations. Hence the recognition system must be able to provide different variations in the poise if the photographs.

3. Support to the video

Not all the information for recognition can be obtained from images; it is also required to get some extra information which can be done from video. The recognition must be having the ability to support the video input along with the audio input. This video type of input will be highly useful for the high security based applications.

4. Less relevant facial features

The recognition logarithms that are utilised for the photograph recognition system are required to consider highly relevant facial features when compared to that of the less relevant facial features. The facial features between the eyes and the nose is considered to be highly relevant when compared to that of the hair styles and the face hair.

5. Security

Security must become an integrate part of the recognition system as most of the recognition system that are designed are used for the security applications in which the identity of the individual will be verified. Based on this identity verification, privileges will be assigned to the identity. This makes security as an important part to be provided by this recognition system.

6. Speed of processing

The processing speed of the recognition system must be very less. The time that is required for the recognition system to match with the stored database and to present the matching score must be very less. In case of the real time applications, this processing speed should be very less so that, there is no requirement for the photographs to be placed for a long duration.

7. Network support

The recognition system that will be designed should be able to be integrated with the other components that are present in that environment. This is possible only if appropriate network architecture is present for the recognition system. At the same time, the software interface of this application must be simpler in nature so that it can be easily integrated with the other software components (Luigi, 2006).

8. Compatibility

The field of the recognition system is highly in the taste of flux. Every day several companies develop a large number of algorithms for the recognition of the photographs. Some of these developed algorithms can be working properly and the other may not. The recognition system that is designed must be highly compatible with the different recognition algorithms that are present in the today market.

9. Server side

The server is mainly responsible in authenticating the user and also helps in actually recognising the identity based on the photographs that are presented. Initially at the side of the server the photograph database will be present. In this database, the different photographs will be stored in the form of the templates. These stored photographs will be later utilised in order for recognising the actual identity of the person. Based on the requests of the client system, the server will respond. When the photograph is presented at the client for the process of recognising, it sends a request to the server machine. In this server the presented photograph will be compared to those present in the database. When there is a match between the photographs, perfect match will be shown. The matching score is mainly used to represent the type of match that is present between the presented photograph and that of the stored photographs (Lone et al, 2011).

10. Client Side

The client of this photograph recognition system is mainly responsible in sending appropriate requests to the server machine. If the recognition process has to be performed then the actual photograph that must be recognised will be presented at the side of the client machine. Based on the photograph presented, it sends a request to the server machine. At the server, the process of recognition takes place and the output will be displayed to the client machine. Here the client interface is designed in such a way that is accepts the input photograph effectively and presents the matching score in an appropriate manner to the client. This matching score will also be interpreted and shown in the user understandable format (Lone et al, 2011).

Chapter 3: Questionnaire

3.1 Overview

Research plays a significant role in this thesis work as it is the main source for the collection of data related to the project. Through this research both primary data and secondary data are collected. This chapter deals in specifying the details of the primary data collection using the questionnaire method. The complete questionnaire along with the response that is gained for this questionnaire from the sample people is provided in this chapter.

3.2 Questionnaire

The data collection method that is employed for this research is the questionnaire. The reason for selecting this questionnaire technique is it helps in collecting the data quickly from a large group of people as similar questions will be asked to all the people. On the other hand, asking the same questions to all the people further makes the data analysis part easier. For conducting the questionnaire, a sample of 20 people is selected so that these sample people represents the overall population. Among the different ways of administering the questionnaire, in this research paper based questionnaire is utilised. The questionnaire will be printed on a paper and will be them distributed to the 20 participants. These participants are given time to fill the questionnaire. Before given the questionnaire, the participants are provided with a consent form (refer appendix A) in which the participants are informed about the main purpose of the research and its objectives. In addition to it the participants will also be ensured about the confidentiality and the integrity of the data that is collected from the participants.

The questionnaire that is prepared for the data collection in this research consists of two sections of which the first section deals with demographic information and the second section deals with project information. In the demographic information section basic details are asked from the participants so that they will feel comfortable in answering the next part of the questionnaire. In this second section project information will be provided where the questions related to the main research topic will be presented. The complete questionnaire with the demographic questions and the project related questions is given in the below section. The responses that are obtained for each question from the 20 sample people are also provided under each question. The results are presented in a graphical format so as to make it clear and easily understandable.

3.3 Questionnaire Questions

Demographic Information

1. What is your age?

- a. Below 20
- b. Between 20 and 30
- c. Between 30 and 60
- d. Above 60

15 participants out of 20 participants have provided that their age is between 20 and 30. 3 of them aged between 30 and 60, 1 was below 20 and the other is above 60 years of old among the overall sample population.

2. What is your gender?

- a. Male
- b. Female

Based on the responses 12 people are identified as males and the reaming 8 are the female people. The selection of both male and female participants for the questionnaire ensures that different opinions can be gathered on the use of photo graphs recognition method for the medical, police and the immigration applications.

3. What is your profession?

- a. Student
- b. Staff
- c. Researcher
- d. Business person
- e. Others (please specify).....

The sample is questioned about their profession in order to ensure that the data is collected from the appropriate people who have some knowledge on the security and the recognition systems. Among the 20 people 12 are students, 5 are research people and the 3 other are staff.

4. What is your study background?

- a. Computer science.
- b. Networking.
- c. Security.
- d. Other (please specify).....

Questioning on the study background of the participants helps in knowing the background of the participants so that the suitability and the reliability of these data can be accessed. Out of the 20 sample people 15 are related to security, 3 are based on computer science and 2 are based on networking. All these people have certain knowledge on security as their background studies also deal with certain security concepts.

5. Have you ever studied security?

- a. Yes
- b. No
- c. The participants are asked if they have studied security so as to know whether the data provided by these people is valid are not. Fortunately all the 20 people answered yes specifying that they have studied security concept in their studies.

Project Information

6. Are you aware of the secure recognition systems?

- a. Yes
- b. No (Please go to question 10)

When the participants are questioned if they were aware of secure recognition systems, all the people have answered yes. As all the 20 participants have studied security in the past they were completely aware of secure recognition system which makes it clear that the data collected from these people will be highly relevant. **Do you think if the photograph recognition system is feasible and also reliable?**

- a. Yes
- b. No

The participants are asked regarding the feasibility and the reliability of photograph recognition system, among the 20 participants 13 of them have stated yes and the 5 stated no while the rest two have not provided answer to the question. From the analysis it can be known that the majority of the people have found that the of photograph recognition system is reliable and also feasible in nature.

7. Is photograph recognition system economical to use in the defensive applications and also in the high security applications?

- a. Yes
- b. No

Here the participants are questioned regarding the cost effective nature of photograph recognition system for the defensive and security applications. 15 of them answering yes and 5 of them answered no. Majority of the participants involved in the research where in the view that the use of photograph recognition systems is highly economic for defensive applications and also for the security applications.

8. How much important it is to implement this a secured system for facial photograph recognition?

- a. Very important.
- b. Important.
- c. Slightly Important
- Not Important

The importance of implementing this photograph recognition system for the facial photographic is questioned to the participants. The responses were bit different from one participant to the other participants as 5 of them said it is very important, 6 said it is important, 5 said it is slightly importance and the other 4 said it is not important.

9. Which of the following is the best applicable software to implement this photograph based secure recognition system?

- a. Java
- b. Microsoft visual studio .net
- c. Mat lab
- d. Other (Please specify).....

Questioning the participants regarding the software is highly important to know the appropriate software for implementing this of photograph recognition system. Among the various options provided java is software that is selected by 10 people, 6 people selected visual studio .net, 2 selected MATLAB and the other two specified PhP as the suitable software for this project implementation.

10. Which of the following is the best database to be used?

- a. Oracle
- b. MySQL
- c. Access.
- d. Other (Please specify).....

The participants were also questioned to know the best data base which can be used for this project. Majority of the people have opted oracle and only 3 people have selected MySQL for this question.

11. Which of the following is the best, user friendly and easy functional interface?

- a. Oracle.
- b. Java.
- c. Microsoft visual studio .net
- d. Other (Please specify).....

Regarding the user friendly nature and the easy functionality interface, the participants have selected the option as Oracle. That is 11 people have selected java is the best and the user friendly interface. 7 selected Microsoft visual studio .net as the user friendly and the rest selected oracle.

3.3 Ethical Considerations

During the process of conducting the questionnaire, ethical considerations are taken into account. Through the concerned form, the participants are made ensure that the collected data will be kept confidential and anonymous. The participation of the sample population is considered as voluntary and can with draw from participation at any movement when required.

Chapter 4: Design of the system

4.1 Overview

The photograph recognition system is initially designed and then implemented in this project. Design is the stage in which the working of the different components of the photograph recognition system will be specified. The specification will be done based on the UML language which stands for Unified Modelling Language. Along with the UML diagram other diagrams are also given in this design chapter.

4.2 Unified Modelling Language

UML is one of the commonly used modelling languages to specify the design of the software system. In this project the use case diagram, activity diagram and the class diagrams are used to explain the system design. Each user (police/medical /immigration) has specified responsibilities in this system. These responsibilities are specified in the form of this activity diagram and the use case diagram. The class diagram includes the information of the main classes along with their attributes which are required for the proper functioning of each user of the photograph recognition system.

Flowchart: Login screen

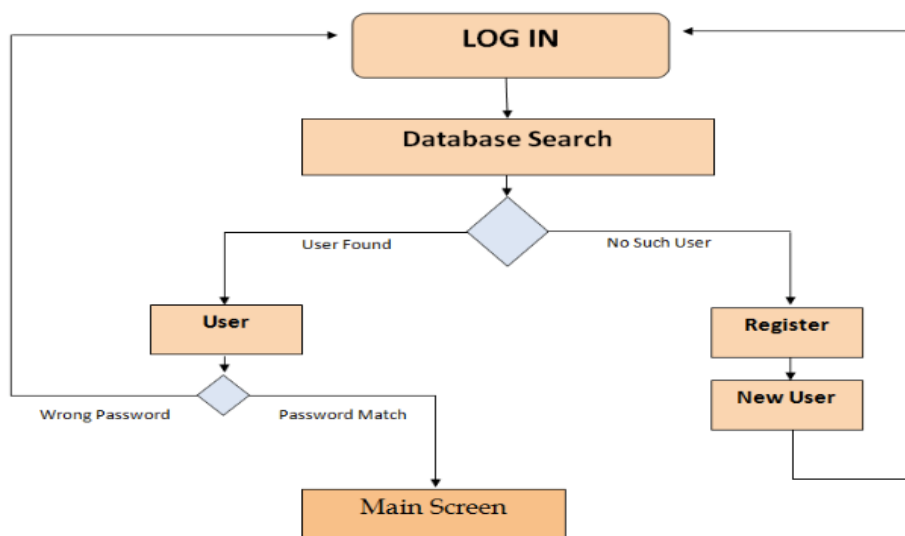


Figure 2 Flowchart of Login screen

The working of the login screen of the final photograph recognition system is specified in the above flow chart. This page works the same for administrator and the other users of the system. In the login screen, the user who has already registered with this system enters the username and the password. Now database search takes place in which the entered details will be compared with the details stored in the database. If there is match between the entered details and the stored details, the user will be directed towards the main screen of the photogram recognition system. If no such user is found in the database then the user will be asked to register into this system. Registration us the step in which the new user will enter all the required details and these details will be stored in the database. Finally after registration, the user will be directed towards the login screen. In this way the only the authorised users are allowed to access the system using proper validation controls.

Flow chart: Main Screen

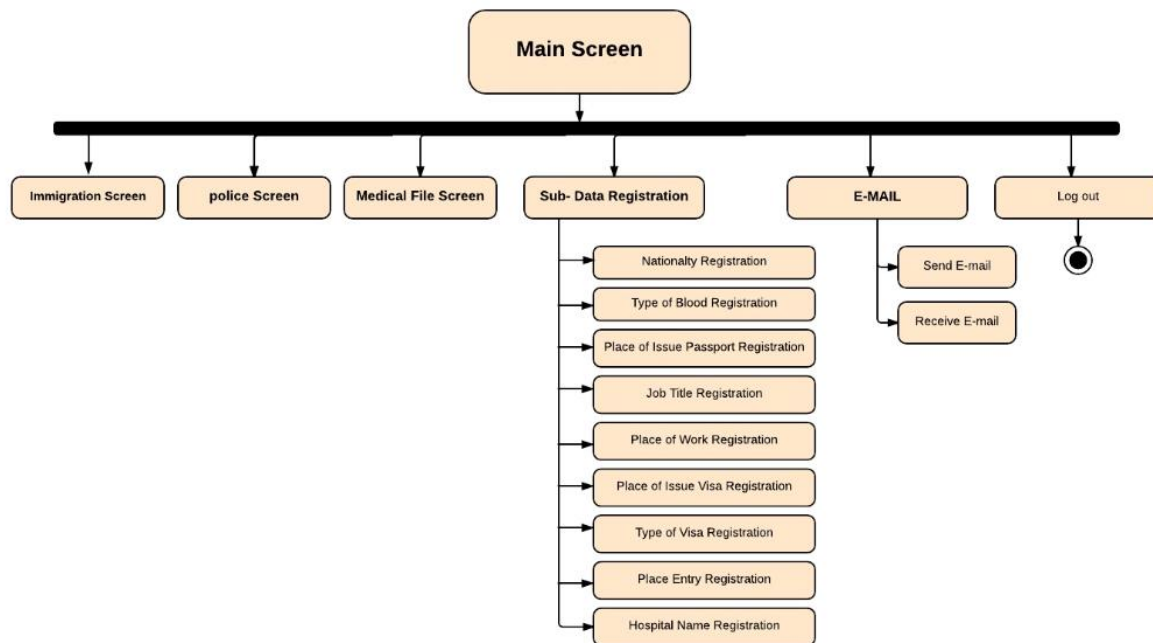


Figure 3 Flow chart of Main Screen

When the users enter the valid username and password, they will be directed to the main screen that consists of several sub sections and each sub section is presented as a separate screen.

The system has the following screens:

- Immigration: This screen will be used by the users related to the immigration department.
- Police: This screen provides all the options required for the police department people.
- Medical: The users related to the medical department utilize this screen for performing their required operations.
- Sub-data registration (look-up menu): This section is mainly used to collect the necessary information from the medical users like their nationality, blood group, location of passport issue, job title, location of the work, location of the visa issue, type of the visa and the entry name.
- Email: This is the section that can be commonly used by all the users to either send or receive the emails.
- Log out: This is the option used by all the users and the administrators to exit the photograph recognition system.

User case for the entire system

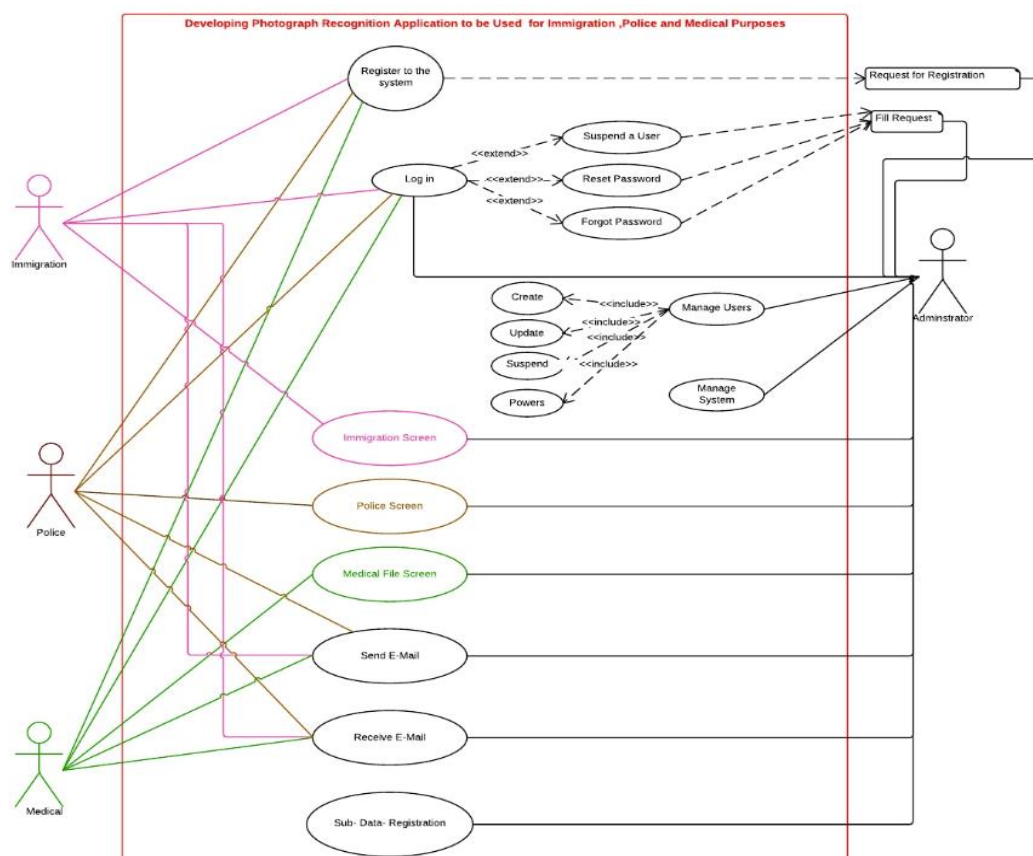


Figure 4 use case diagram of the photograph recognition system

The use case diagram of the photograph recognition system that can be used for the police, immigration and the medical people is shown above. This use case diagram clearly specifies that the system consist of four main users namely admin, police user, medical user and the immigration user. Each user can perform certain functionalities that are indicated in the form of the ovals which are specified as the use cases. All the users are required to login into the system before performing any further actions. In case of the admin, he can control the complete application and also manage the system and users present in the photograph recognition system. Any new user (medical or police or immigration) will first register and then login into this application. The immigration user after successful lignin uses immigration screen and can send/ receive the e-mails. In the same way, the police user after successful login uses police screen and can send/ receive the e-mails. Similarly, the medical user after successful lignin uses medical screen and can send/ receive the e-mails. All these screens are controlled and managed by the admin.

Activity diagram: Police

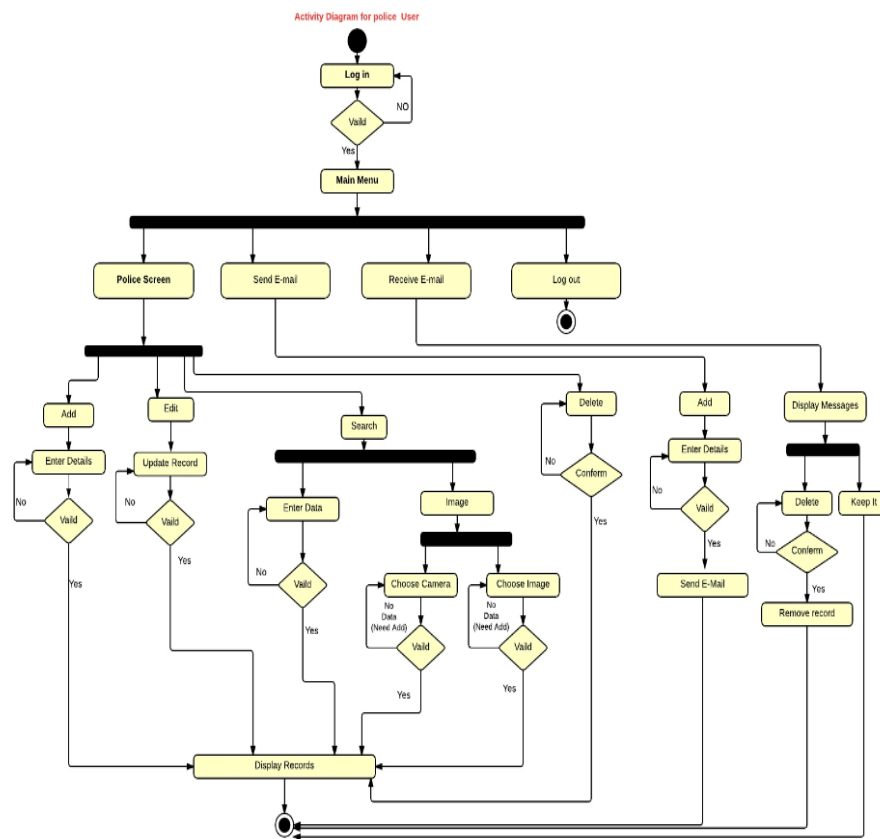


Figure 5 activity diagram of the police

The activity diagram of the police indicates the different activities that can be performed by the police user. After login, the police user can access the police screen, can send e-mails, receive e-mails and can finally logout the application. In the police screen, this user can enter his details or can update the existing details and can also delete the existing details. The police user is also allowed to search for the required person using the search option that is provided in this section. Using the send e-mail option, the police user can send the emails and through receive email option he can either keep that received mail or can delete that e-mail.

Activity diagram: medical

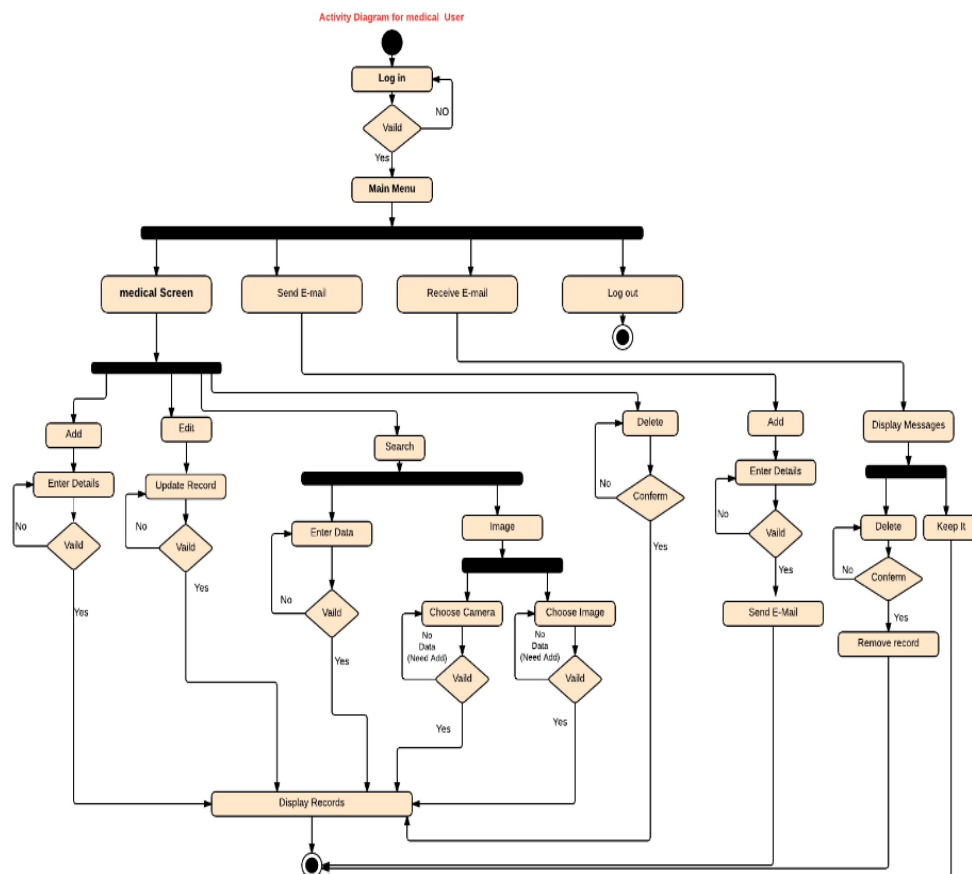


Figure 6 activities that can be performed by the medical user

The various activities that can be performed by the medical user of the photograph recognition system are given in the above figure. Here after the successful login, the medical user can access the medical screen, can send the e-mails, receive the e-mails and can logout. In this medical screen, the medical user can add any details, update the existing medical records, delete the exiting details and can also search for the required users in a valid manner. Using the send e-mail option, the medical user can send e-mails to the required people and through receive e-mails, the e-mails can be received which can either stored or deleted. Finally the medical users can logout the application.

Immigration

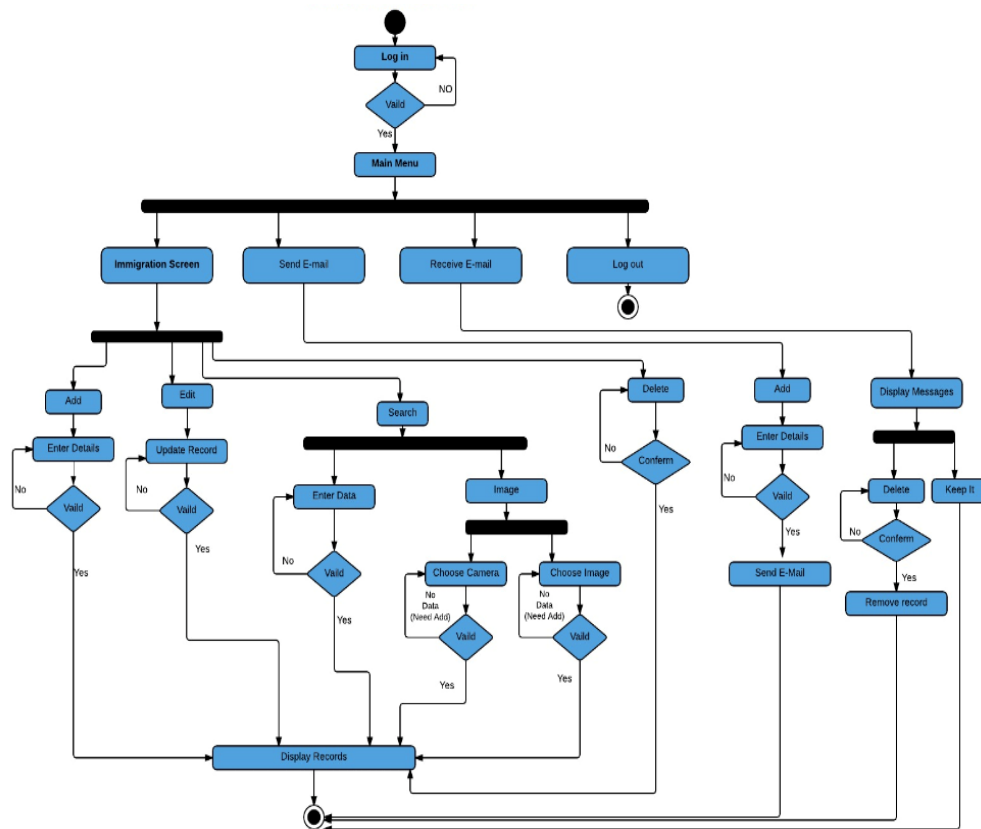


Figure 7 immigration user after entering the photograph recognition system successfully

The immigration user after entering the photograph recognition system successfully can use the immigration screen or the send e-mail; receive e-mail or the logout screen. Under the immigration screen, the immigration user can add new details, can update the existing records or delete the existing records. In addition to it, searching can also be done by this immigration user in a valid manner. In addition to it, this immigration user can send e-mails or can receive the e-mails using the appropriate screens. Finally this user can exit the application using logout option.

Entity Relationship Diagram: Police

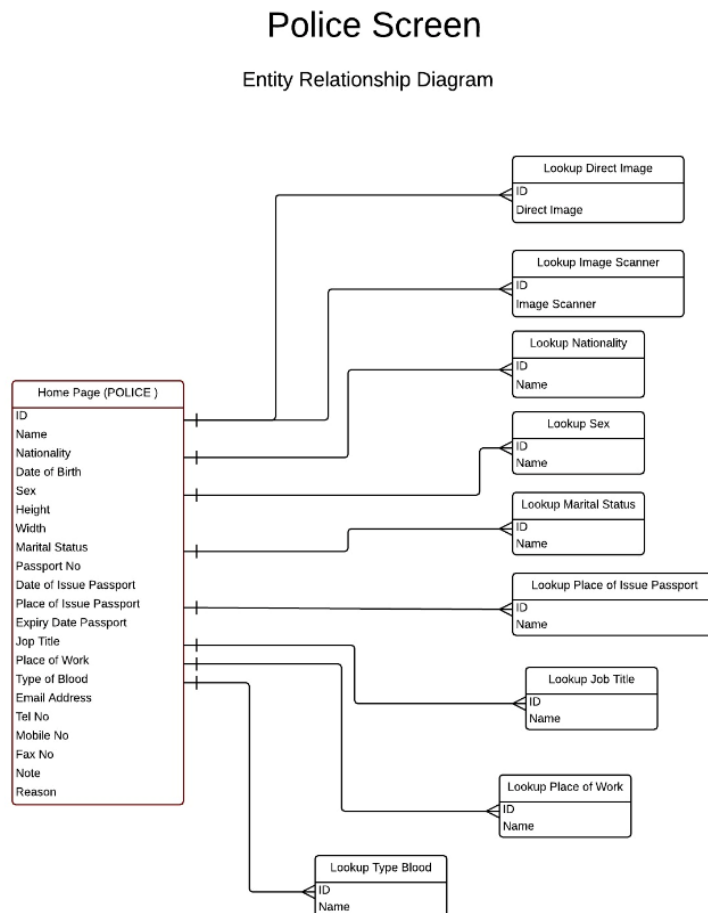


Figure 8 Entity Relationship Diagram: Police

The entity relationship diagram for the police entity is shown above. This police entity contains several attributes that are individually specified in the form of rectangles. These attributes combine form the police entity. These attributes includes direct image, image scanner, nationality, sex, marital status, job title, place of work, type of blood and the place of passport issue as indicated in the above figure.

Entity Relationship Diagram: Medical

Medical Screen Entity Relationship Diagram

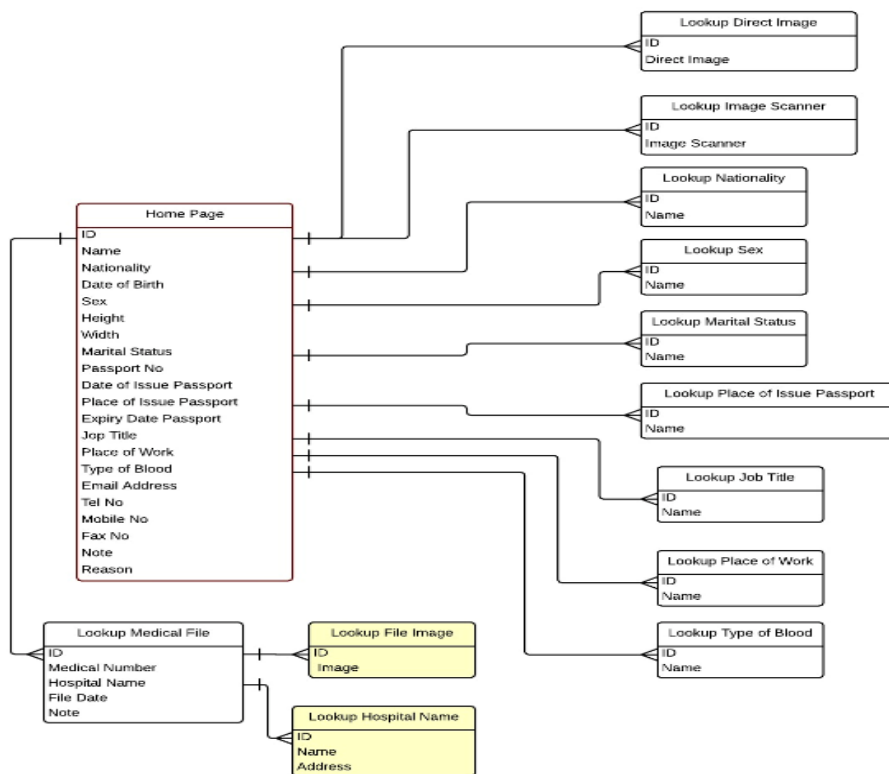


Figure 9 entity relationship diagram for the medical user

The entity relationship diagram for the medical user is indicated in the above figure. The main entity of the medical user consist of several entities like nationality, sex, marital status, job title, work place, blood type, nationality, direct image and the image scanner. Medical file is the other entity to which several attributes are present like file image and the hospital name.

Entity Relationship model: Immigration

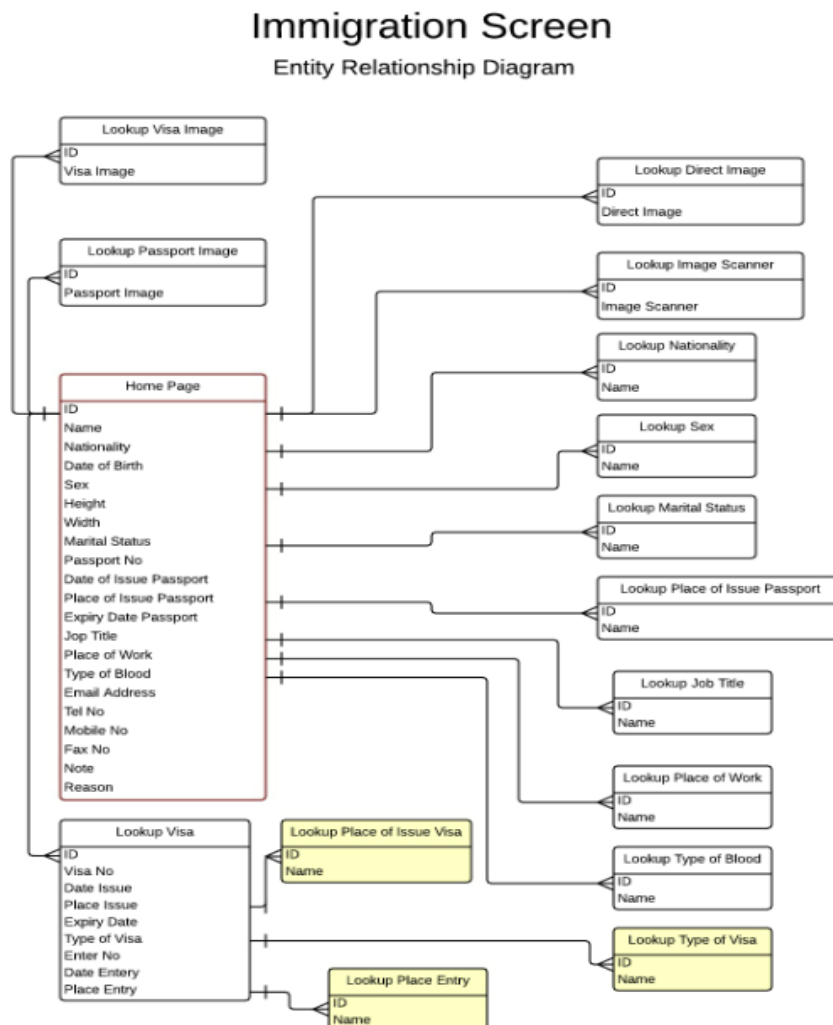


Figure 10 entity relationship model of the immigration user

The entity relationship model of the immigration user is indicated above. There are two main entities present in this model namely home page of the immigration user and the other one is the lookup visa. In case of the lookup visa, the different attributes that are related to it are place of visa issue, place of entry and the visa type. For the immigration user the different entities involved are job title, blood type, work place, passport issue place, marital status, sex, display image and others.

Privileges Screen

Entity Relationship Diagram

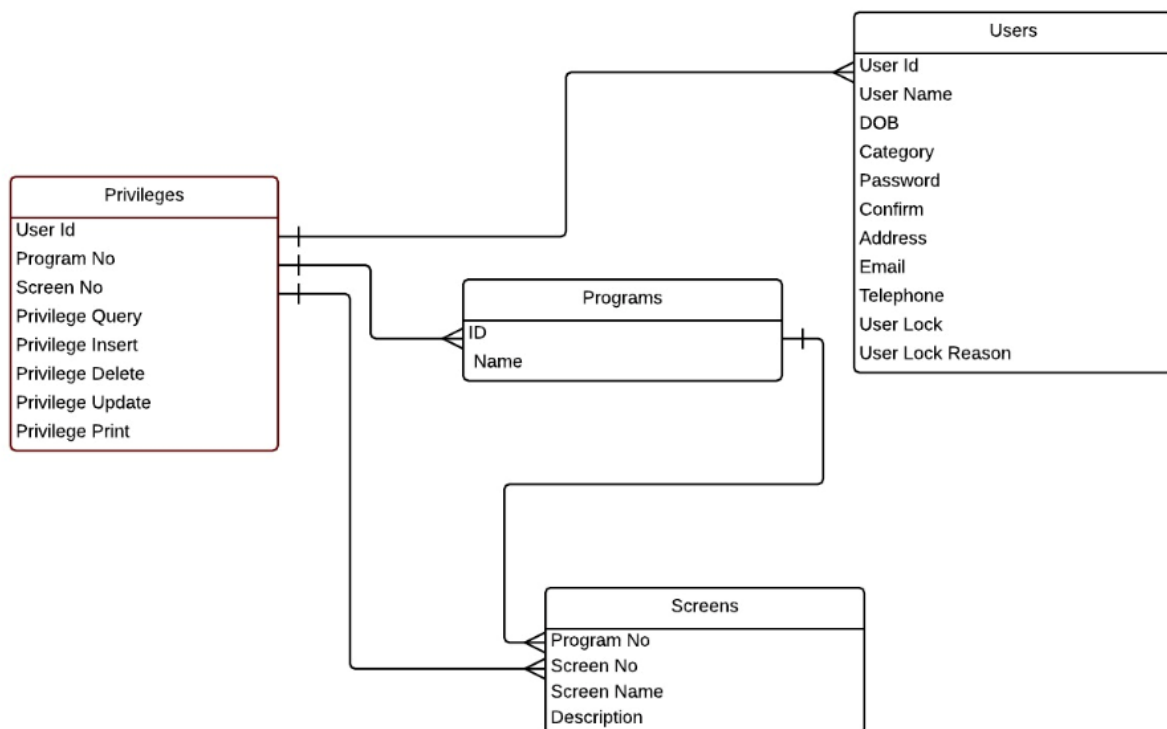


Figure 11 entity relationship model for the privileges

In the above figure the entity relationship model for the privileges screen is specified. These privileges will be assigned to the users based on the programs. The users based on the assigned privileges can access different screens having screen name, screen number, description and the program number as shown in the above figure. The managing of these privileges and the allotment of the privileges to different users of the photograph recognition system is done by the administrator.

Email Screen

Entity Relationship Diagram

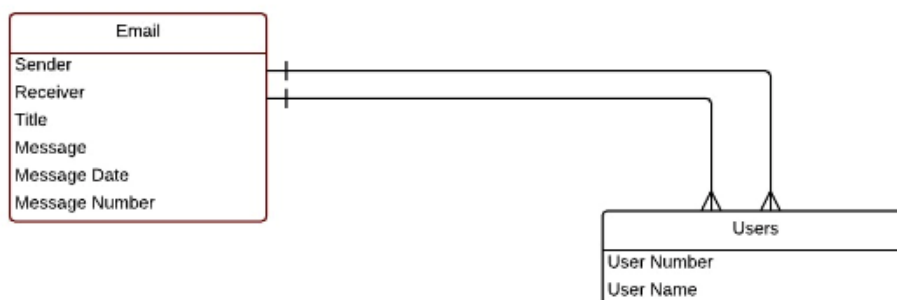


Figure 12 entity relationship model for the email screen

In the above figure the entity relationship model for the email screen is given below. This email screen can be utilized by any user related to medical or police or the immigration department. Based on the user number and the user name they can send emails and can also receive the emails whenever required.

Flow chart of Eigen face recognition algorithm

Facial recognition mainly deals in discriminating the input signals which is the image data into various classes which are persons. Even though the input signals are highly noisy mainly caused due to lighting differences, different poses, yet these input signals have certain patterns occurring in them. These patterns which occur in all the input signals or in some input signals are termed as Eigen faces in the face recognition domain. These Eigen faces which are generally termed as the principal components can be easily extracted from the original image with the help of the mathematical tool like principal component analysis. The face recognition algorithm that is based on Eigen faces is indicated in the below figure.

In this algorithm, the original images which are present in the form of the training set will be transformed into Eigen face set E . In the next step, the weights for each image that is present in the training set will be calculated and then will be preserved in the set W .

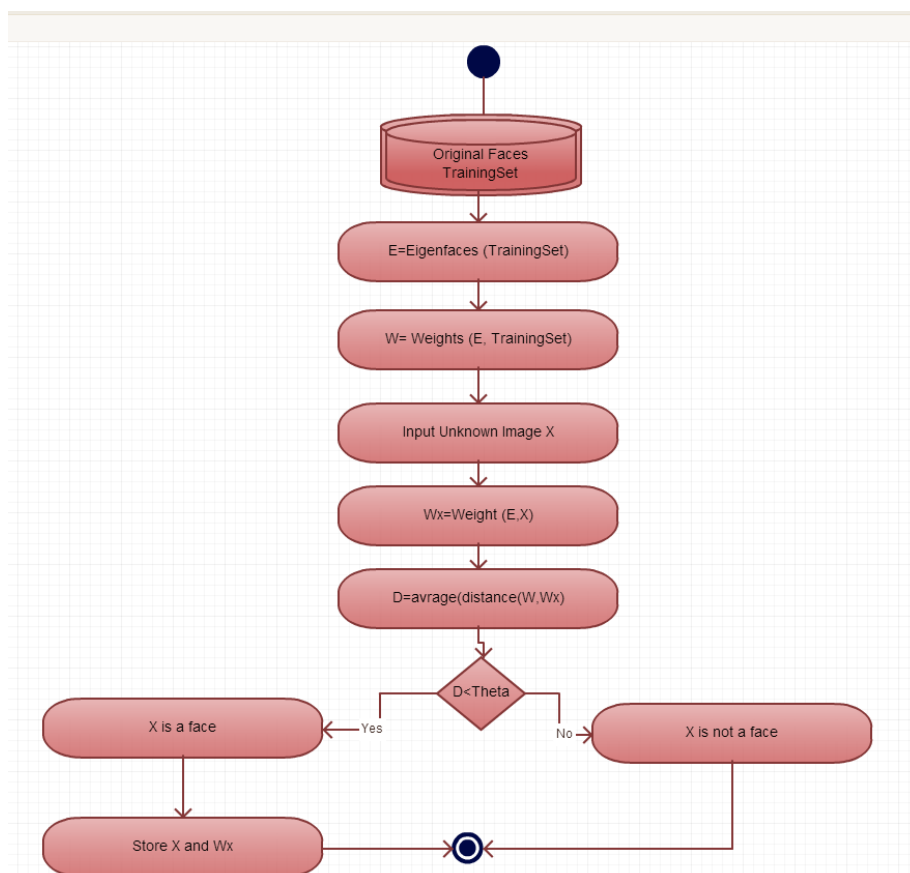


Figure 13 Flow chart of Eigen face recognition algorithm

When an unknown image X is observed, the weight related to this unknown image will be calculated and then will be preserved in a vector represented as W_x . Later the vector W_x will be compared with that of the other image weights for which certainly weights are present in the training set W . The best way to perform this comparison is to consider each of the weight vectors in the form of a point present in the space and then the average distance that is present between W_x and that of the weights present in the training set W . this distance calculated will be termed as Euclidean distance. After calculating this Euclidean distance it will be verified if this average value is greater than a threshold value n . If this value of the distance exceeds threshold value it indicates the weight vector related to unknown image which is W_x is very far from that of the weights related to the normal faces. In this situation the unknown image X will not be treated as the face. In case if this unknown X is considered to be a

face then the weight vector of this unknown image W_x will be preserved for the sake of later classification. The optimal value of the threshold must be determined in an empirical manner.

4.3 Summary

The design of the photograph recognition system is given in this chapter using the unified modelling language diagrams and also the entity relationship models. In this design chapter it is specified that the photograph recognition system that will be implemented consists of four users which are administrator, police user, migration user and also the medical user. Each user will be provided with a specific screen and then can send and receive emails using this application.

Chapter 5: Implementation of the System

5.1 Overview

The development of photograph recognition system is done in this project which can be used by the immigration people, police department and also the medical people to recognize individual based on the photographs. Using the design, the implementation of this system is done with the help of java platform. The details of this developed system are presented in this chapter and also are also clearly explained.

5.2 Implementation Details

In the photograph recognition system that is implemented in this project capturing of the images will be done so as to provide the recognition. The use of java platform is done for capturing the required images of the user. The interface of the application is also designed through which the user can interact with the photograph recognition system and can provide the input details. The design and the development of this interface are done in such a way that the interface looks professional and also attractive to the users. With the help of oracle builder form the interface of this photograph recognition system is developed. The images that are captured using java platform are required to be stored in a database and later they have to be retrieved when the recognition process takes place. For this purpose a database is used in this project which is oracle database version 10g. The selection of these software tools, java, oracle builder and oracle database are done in order to overcome any compatibility issues which can arise by selecting other incompatible software tools.

5.3 Models Present in the System

The photograph recognition system that is developed in this project consists of four main models and each module is used by a specific type of user. These users along with the responsibilities of these users are specified below.

1. Admin

The admin is responsible in controlling the complete application and also in controlling the other users who are present in this application. The administrator gives appropriate privileges and controls the application by adding, removing or updating the features. This administrator can also add or delete or update the users who are present in this application.

2. Police User

The police are a specific user who is required to initially register into the application and then login to perform various other functionalities. This police can register new users, can search for the details of any existing users and can also view the details of other users that are been registered by this user.

3. Medical User

This specific user is related to the medical field and must first register and then login into the application. Even this user can register new users, search the existing users, update the details of existing users and view those details.

4. Immigration User

Same as the police and the medical user even the immigration user is required to register and then login into the application. The immigration user can register other users; they update their details, view their details, and search for their details.

5.4 Results Achieved

Login screen

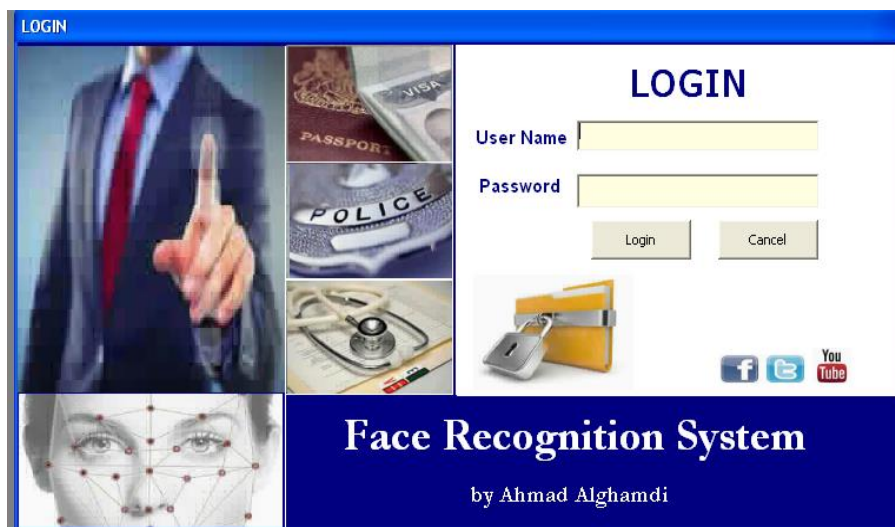


Figure 14 login page of all the four users

The login page of all the four users is given above. Valid user name and the password are required to be entering by these users to access the photograph recognition system. These users are provided with the login details during the registration stage.

n screen

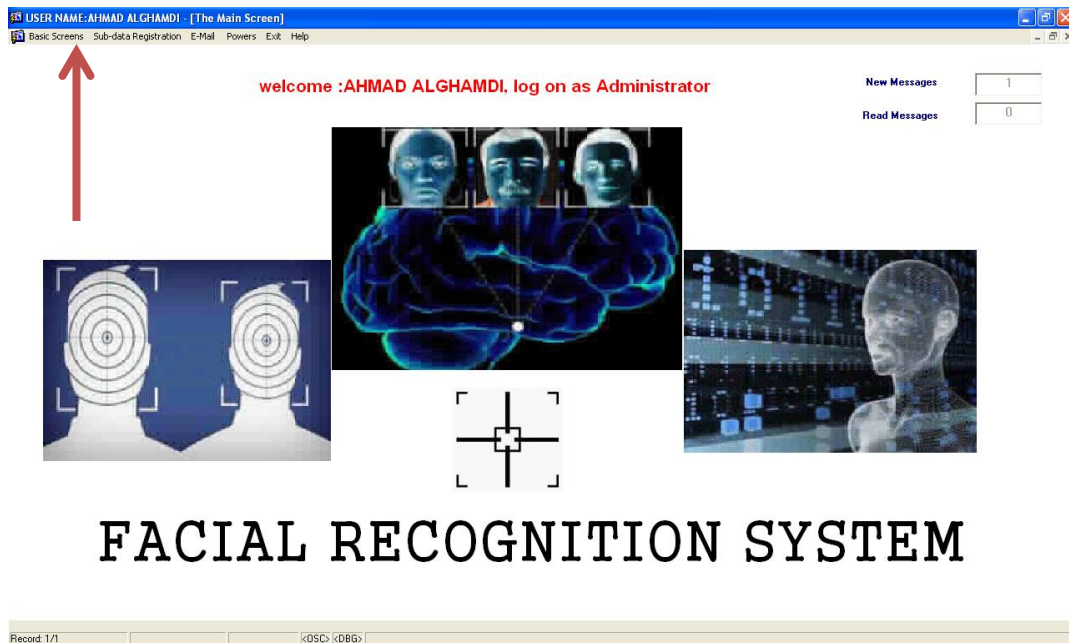


Figure 15 Main page

After the user log in they can choose the desired screen they are in the system for from the button (mentioned in the above image) “Basic Screen” where each user has only the authority to choose the screen that they are allowed for. In addition to this the users can also access the other options like sub data registration, sending emails and power privileges which are indicated in the above screen.

Police screen

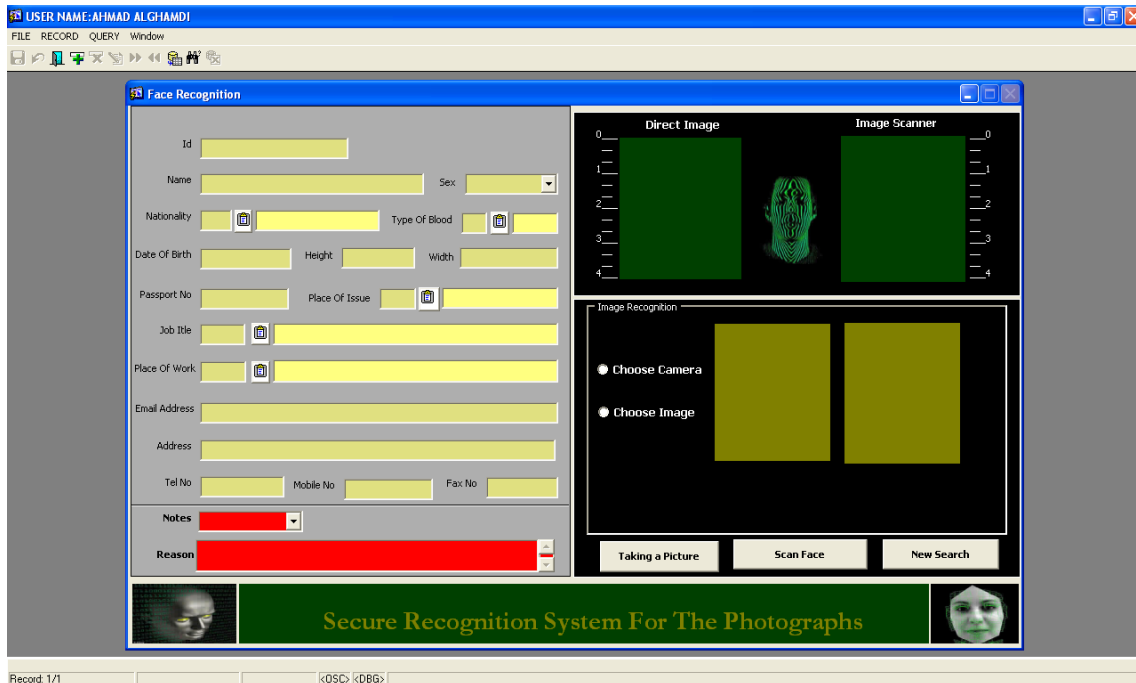
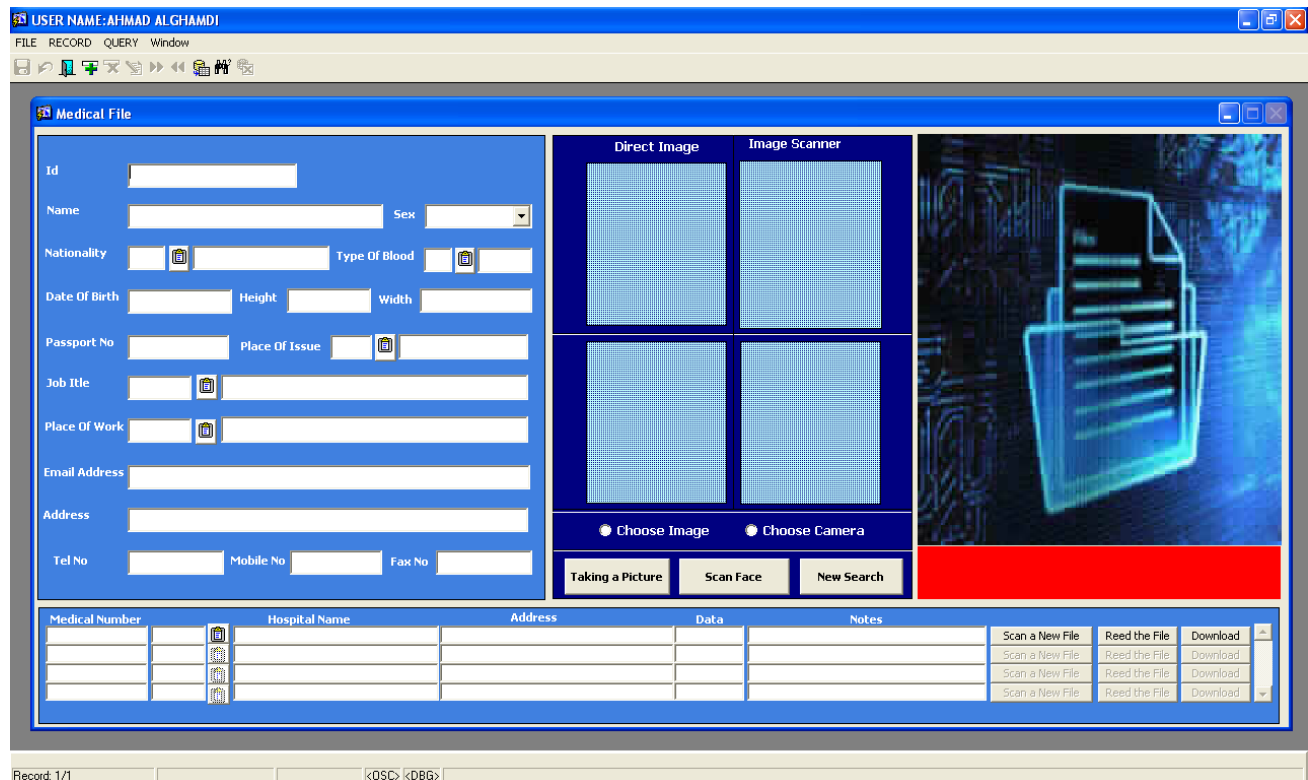


Figure 16 police user has selected the police screen

Under the “basic screen” option the police user has selected the police screen and the screen above will be displayed. In this screen the police user can enter the details of a new user using the several input fields that are provided. These input fields take the information provided and store it in the database. In addition to the information direct image of the user will also be stored in the database. Here the process of image recognition will be performed by the police user either by choosing the camera image or by choosing an image.

Medical Screen



USER NAME: AHMAD ALGHAMDI

FILE RECORD QUERY Window

Medical File

Id:

Name: Sex:

Nationality: Type Of Blood:

Date Of Birth: Height: Width:

Passport No: Place Of Issue:

Job Title:

Place Of Work:

Email Address:

Address:

Tel No: Mobile No: Fax No:

Direct Image **Image Scanner**

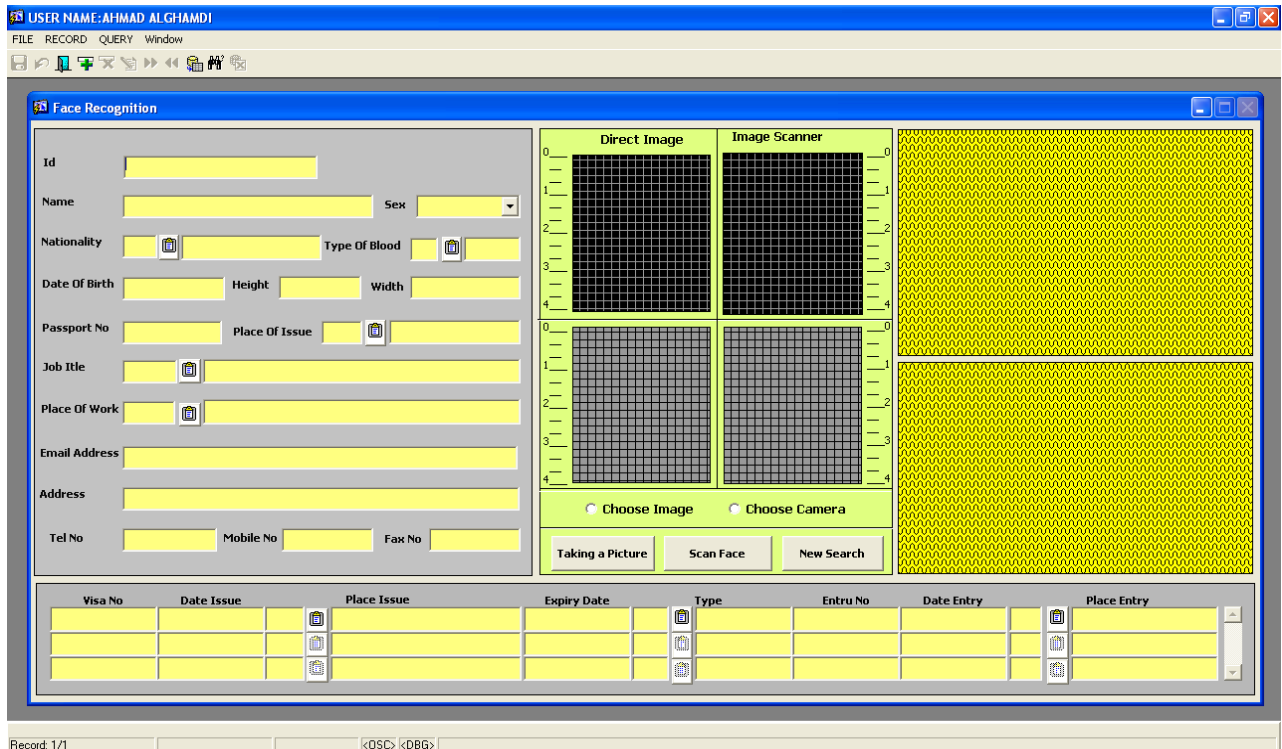
Medical Number	Hospital Name	Address	Data	Notes	Scan a New File	Reed the File	Download
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="button" value="Scan a New File"/>	<input type="button" value="Reed the File"/>	<input type="button" value="Download"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="button" value="Scan a New File"/>	<input type="button" value="Reed the File"/>	<input type="button" value="Download"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="button" value="Scan a New File"/>	<input type="button" value="Reed the File"/>	<input type="button" value="Download"/>

Record: 1/1

Figure 17 medical screen when selected by the medical user

The medical screen when selected by the medical user from the “basic screens” is shown in the above screen shot. The medical files of a new user can be added by this medical user by entering the require details in the input boxes that are provided in the above screen. The selection of the image can be done either by taking the direct image or through the image scanner. Based on this type of the input image, face recognition will take place.

Immigration screen



USER NAME: AHMAD ALGHAMDI

FILE RECORD QUERY Window

Face Recognition

Id:
 Name: Sex:
 Nationality: Type Of Blood:
 Date Of Birth: Height: Width:
 Passport No: Place Of Issue:
 Job Title:
 Place Of Work:
 Email Address:
 Address:
 Tel No: Mobile No: Fax No:

Direct Image: ☐ Image Scanner: ☐
 Choose Image: ☐ Choose Camera: ☐
 Taking a Picture: Scan Face: New Search:

Visa No	Date Issue	Place Issue	Expiry Date	Type	Entru No	Date Entry	Place Entry
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Record: 1/1 <DBG>

Figure 18 immigration user after the successful login

The immigration user after the successful login selects the immigration screen from the “Basic screen” option present in the main page. Here the immigration user can add the details of the new immigration user and also can add these pictures either through direct images or by scanning them. This application has the support of the camera for taking images directly or can also use photographs that are scanned through image scanner.

Sub-data registration

The sub-data registration is the other option that is present in the main screen of the application and is used to register (add) new data to the following options which is known as look up system

Job Title

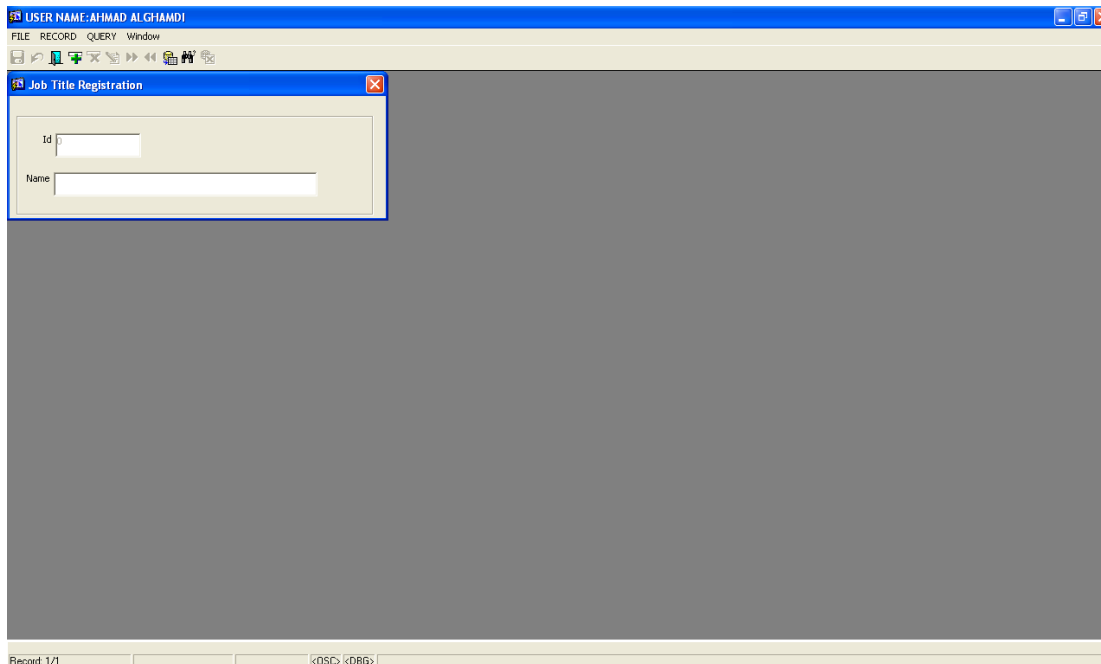


Figure 19 adding of the job title is done into the application

In the above screen, the adding of the job title is done into the application for which the details of id and the name have to be entered.

Place of issue passport

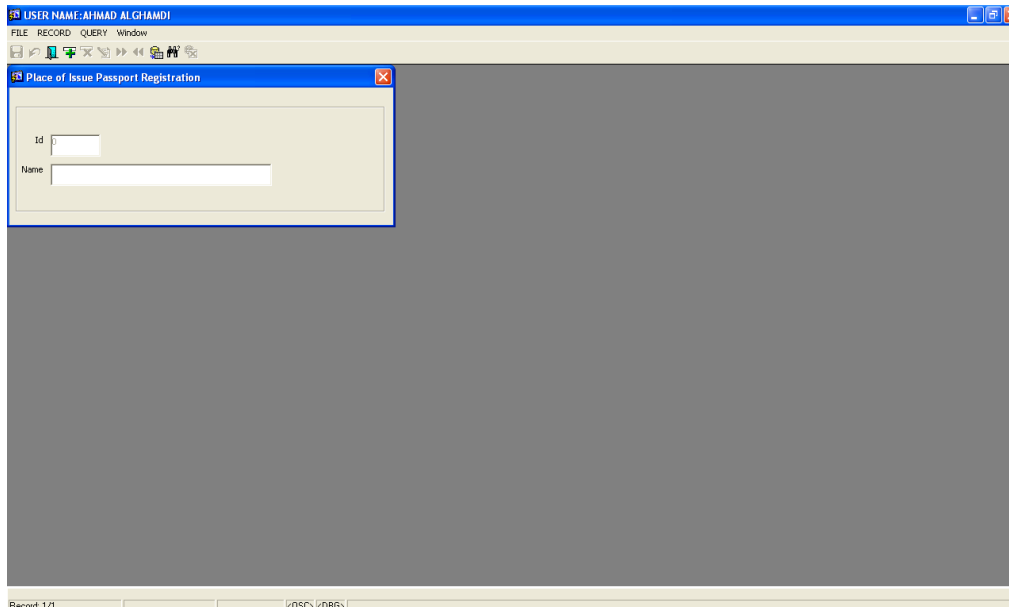


Figure 20 Place of issue passport

In the above screen, the adding of the place of passport issue is done into the application for which the details of id and the name have to be entered.

Place or Work

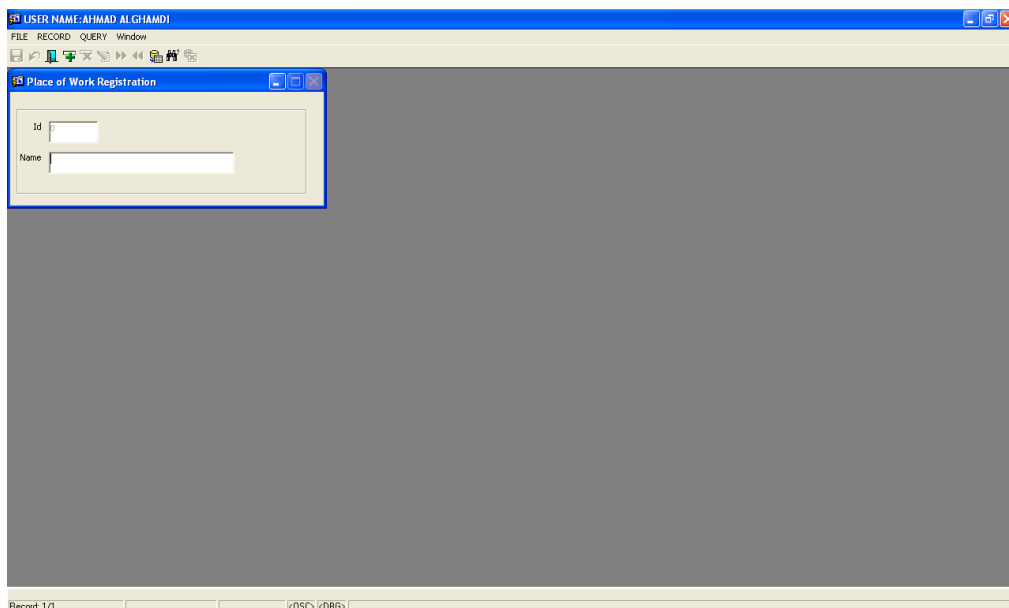


Figure 21 the details of the place of work registration

Here the details of the place of work registration can be added to the application where the id and the name will be provided.

Place of issue visa

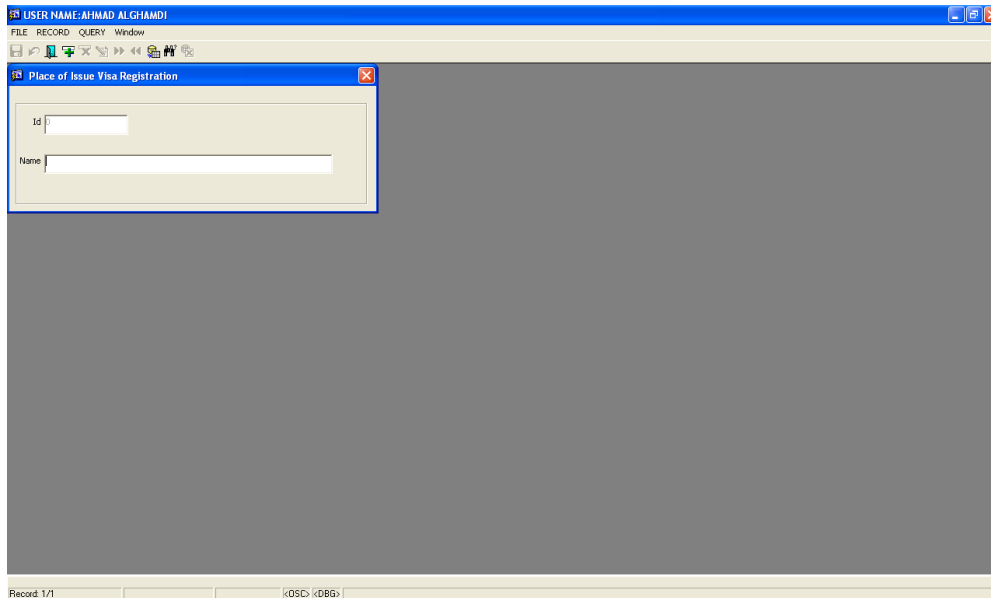


Figure 22 place in which the visa is issued

The details of the place in which the visa is issued will be entered into the application where the id and the name will be provided.

Type of visa

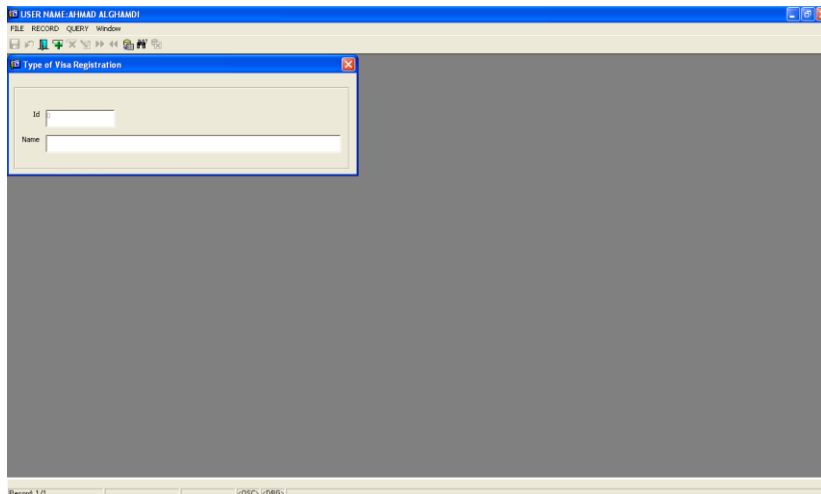


Figure 23 Type of visa

The details of the type of visa are the entered into the application in the form of lookup and these details are entered in the form of id and the name.

Place Entry

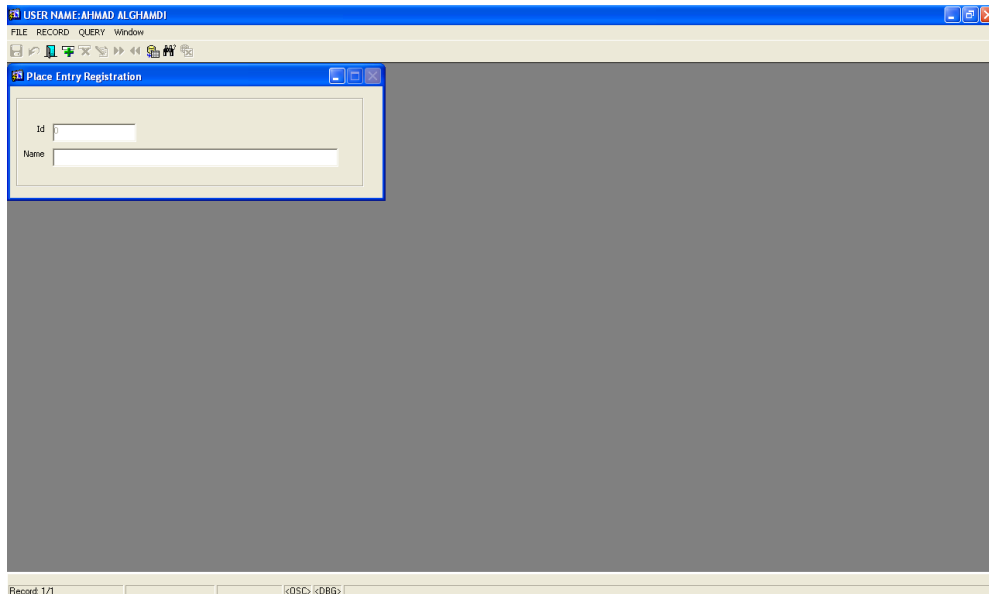


Figure 24 Place Entry

The place of entry is the other field that is entered into the application by the user and the entering of these details is done in the form of the id and the name.

Hospital Name

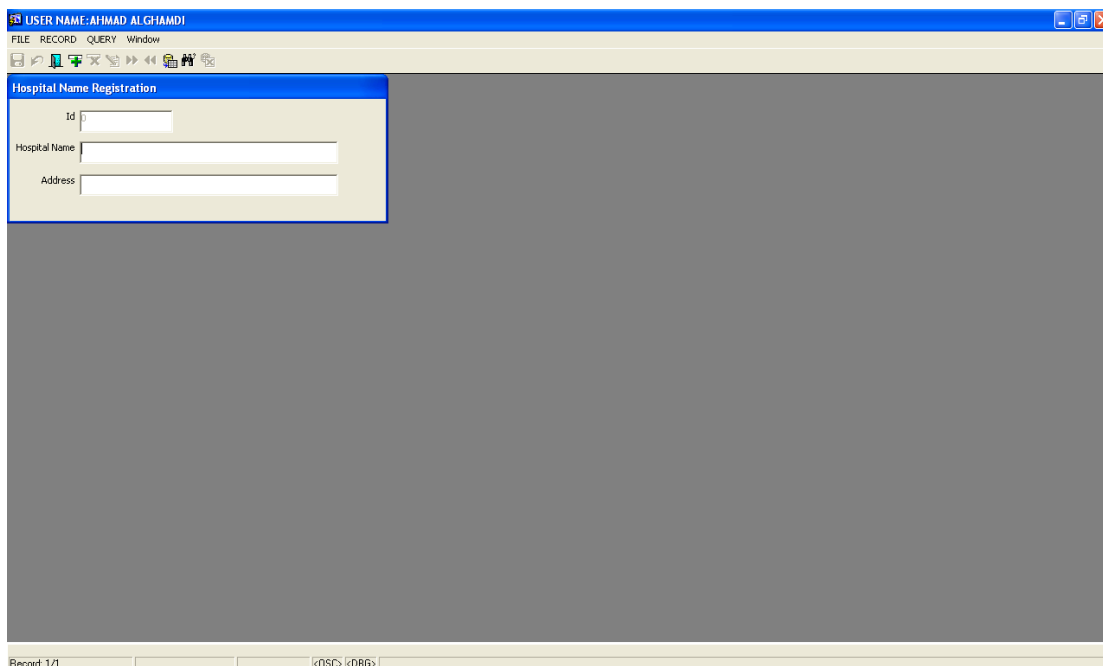


Figure 25 details of the hospital name and its address

The details of the hospital name and its address are then entered into the application using the interface that is provided above. Here ID is also entered along with the hospital name and the address details.

Email screen

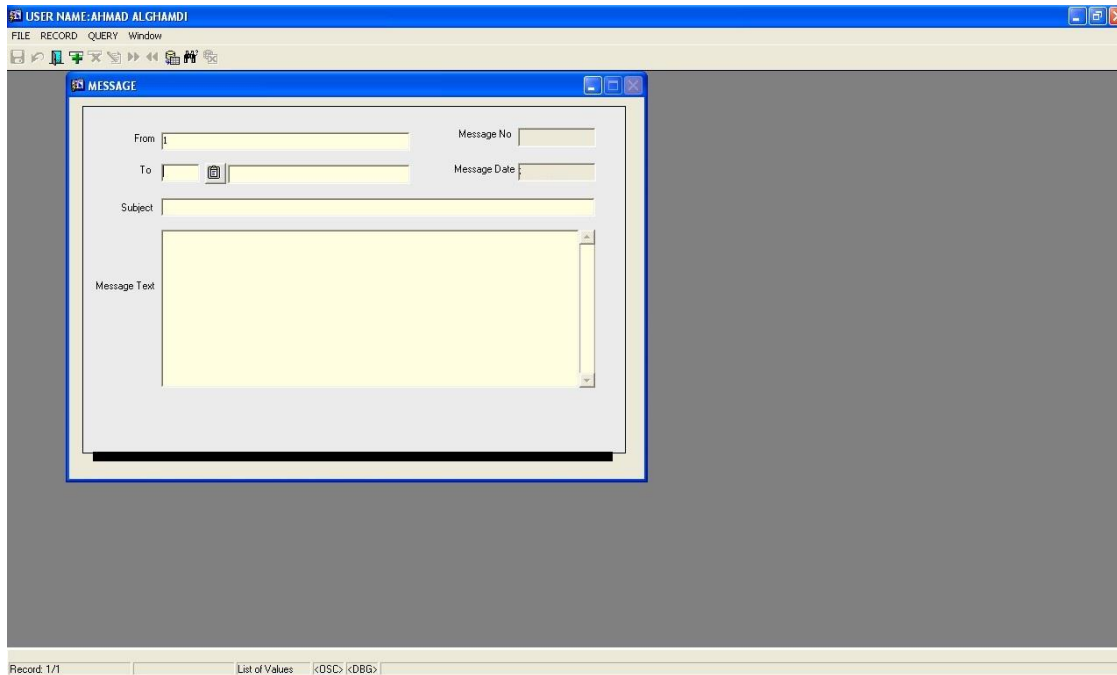
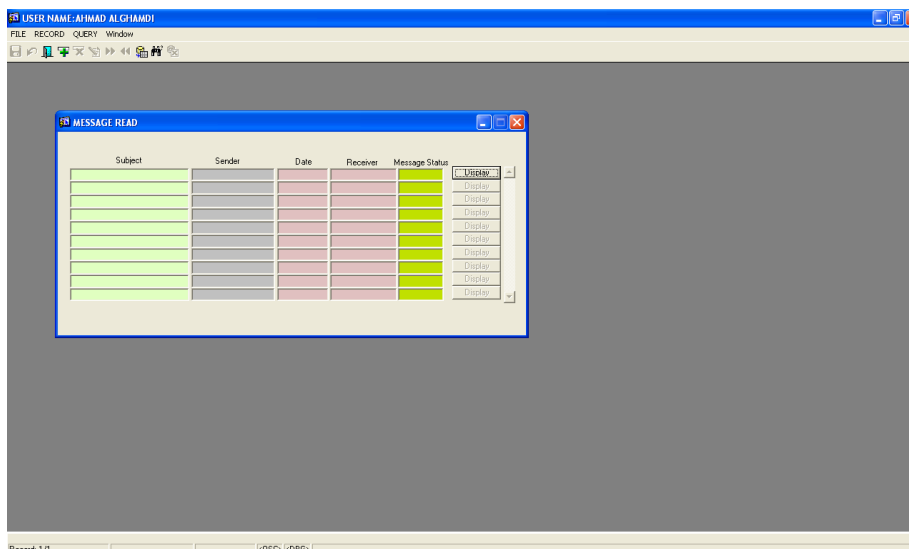


Figure 26 home page of the photograph recognition system

Among the several options available on the home page of the photograph recognition system, email is one option which can utilise by all the users. The screen that is used to send email from one user to the other user is shown above. Here the input related to sender, receiver, subject and the actual message must be entered before sending the message to the receiver.



Subject	Sender	Date	Receiver	Message Status
				Display
				Display
				Display
				Display
				Display
				Display
				Display
				Display
				Display
				Display

Figure 27 information about the messages

The above screen shows the information about the messages that are received and the details of the message like subject, date, sender and the status of the message. Using the display button the message that is received can be viewed by the main user of the photograph recognition system.

Power privileges Screen

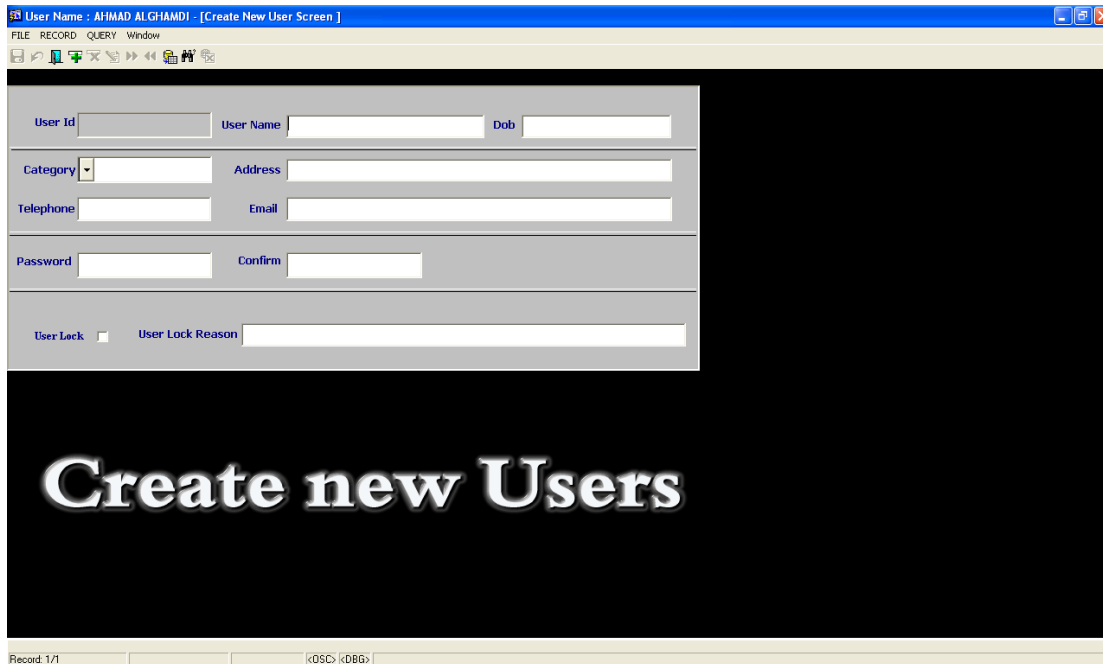
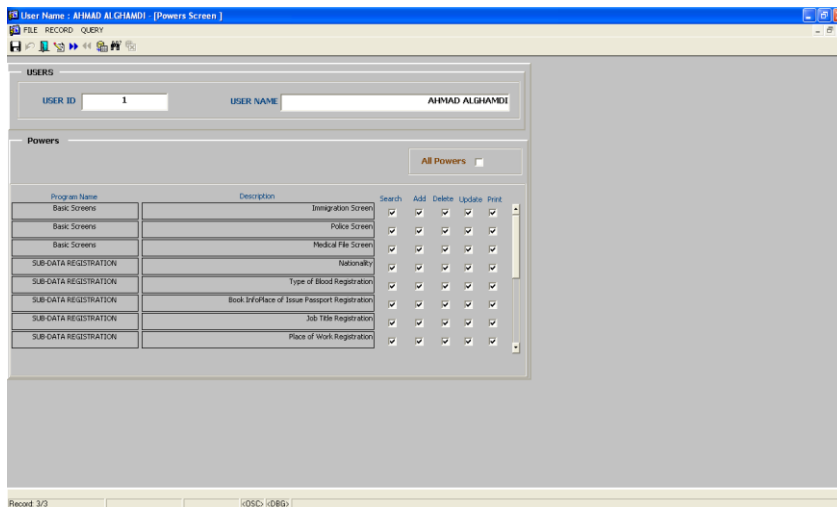


Figure 28 Power privileges Screen

The administrator of the photograph recognition system uses this power privilege option for creating new users of the application and for providing privileges for the newly created user. During the process of creating new user, several details have to be entered like user id, user name, data of birth, address, telephone number and the password details.



Program Name	Description	Search	Add	Delete	Update	Print
Basic Screens	Immigration Screen	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Basic Screens	Police Screen	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Basic Screens	Medical File Screen	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
SUB-DATA REGISTRATION	Nationality	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
SUB-DATA REGISTRATION	Type of Blood Registration	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
SUB-DATA REGISTRATION	Book Info/Place of Issue Passport Registration	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
SUB-DATA REGISTRATION	Job Title Registration	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
SUB-DATA REGISTRATION	Place of Work Registration	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Figure 29 the way in which the privileges are assigned

The above screen shows the way in which the privileges are assigned to the users of this photograph recognition system based on their user id and their user name. The tick in the box represents that the user is allowed to perform that particular function in the respective program. The user “Ahmed Algamdi” is the administrator and hence is provided with all the powers to access all the privileges of the application.

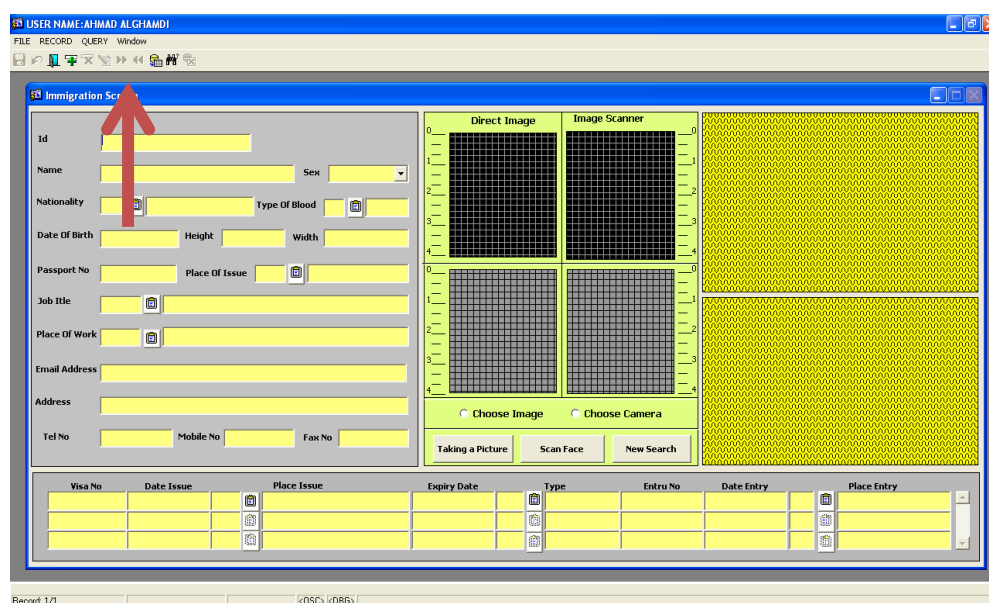
Chapter 6: System Testing

6.1 Overview

This section of the thesis explains about the working of the photograph recognition system. The details of the input that must be provided, the output that will be obtained, error messages which will be displayed are provided with the appropriate screen shots in this chapter.

6.2 System Functioning

Immigration screen

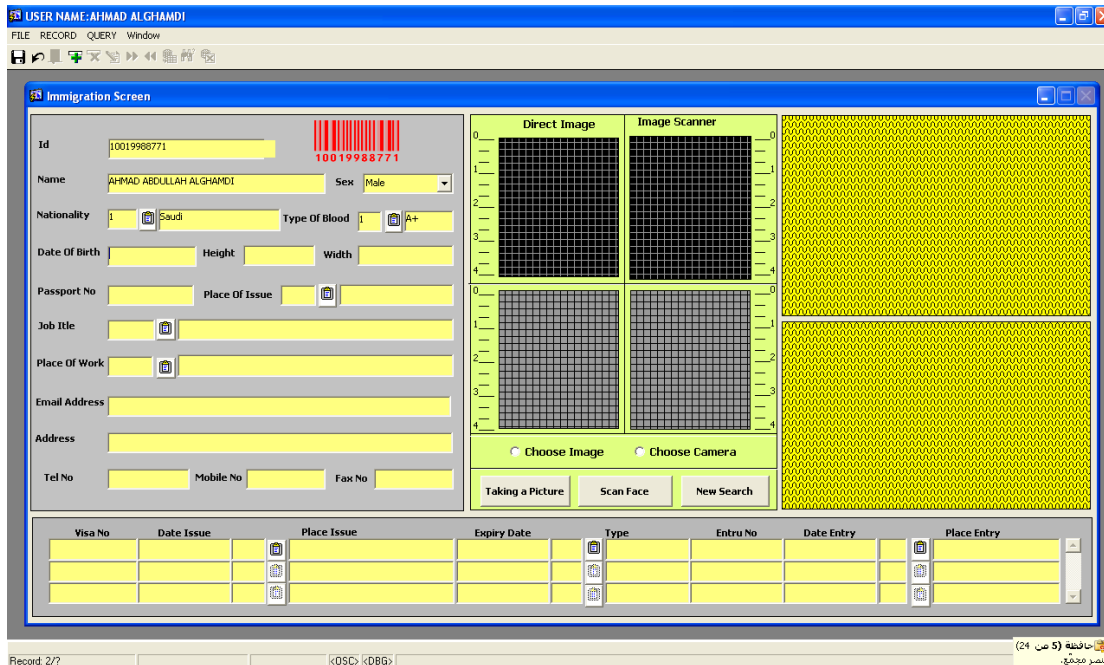


Visa No	Date Issue	Place Issue	Expiry Date	Type	Entru No	Date Entry	Place Entry

Figure 30 insert new registration details

By selecting the button mentioned in the above image, the user will be able to insert new registration details.

Insert details

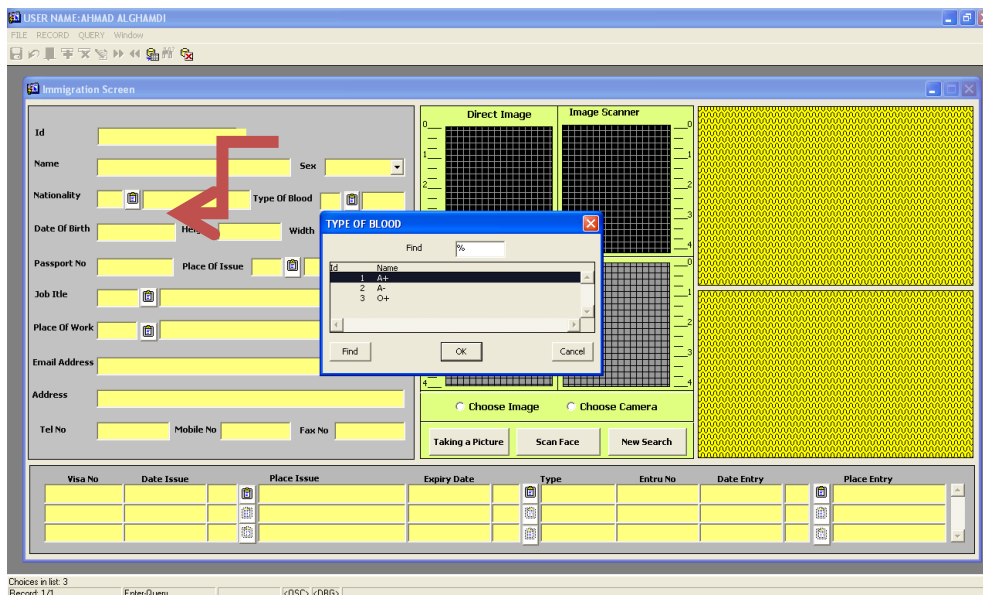


The screenshot shows the 'Immigration Screen' application. The user is logged in as 'AHMAD ALGHAMDI'. The form includes fields for Id (10019988771), Name (AHMAD ABDULLAH ALGHAMDI), Sex (Male), Nationality (Saudi), Type Of Blood (A+), Date Of Birth, Height, Width, Passport No, Place Of Issue, Job Title, Place Of Work, Email Address, Address, Tel No, Mobile No, and Fax No. There is a barcode for the Id. To the right, there are image capture areas labeled 'Direct Image' and 'Image Scanner'. Below these are buttons for 'Choose Image', 'Choose Camera', 'Taking a Picture', 'Scan Face', and 'New Search'. At the bottom, there is a table for visa information with columns: Visa No, Date Issue, Place Issue, Expiry Date, Type, Entru No, Date Entry, and Place Entry. The status bar at the bottom indicates 'Record: 2/7' and 'حالة (5 ص 24)'. There is also a small icon for 'عند التصفح'.

Figure 31 immigration user is trying to enter details of a new user

The immigration user is trying to enter details of a new user using alter fields that are present in this immigration screen.

Look up menu



This screenshot shows the same 'Immigration Screen' application, but with a 'TYPE OF BLOOD' lookup dialog box open. A red arrow points to the 'Type Of Blood' field in the main form. The dialog box has a 'Find' field and a list of blood types: 1 A+, 2 A-, 3 O+. The status bar at the bottom indicates 'Choices in list: 3' and 'Record: 1/7'.

Figure 32 checking the button marked above

By checking the button marked above, the user can choose from a list that will appear instead of inputting details manually for the nationality, blood type and others.

Image Recognized

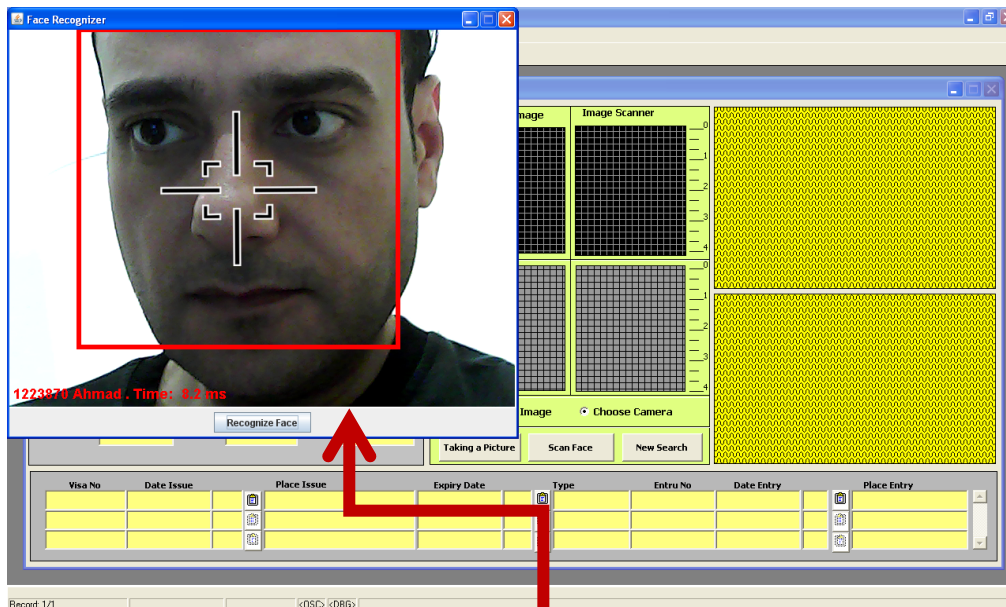


Figure 33 face has been recognised by the camera

The face has been recognised by the camera, and then by clicking the above specified button the image will be captured

Details matched



Figure 34 Details matched

The captured image is compared with the scanned image as shown above. As there is match between these two images, the visa details are being displayed for the immigration user as shown above. **can face**

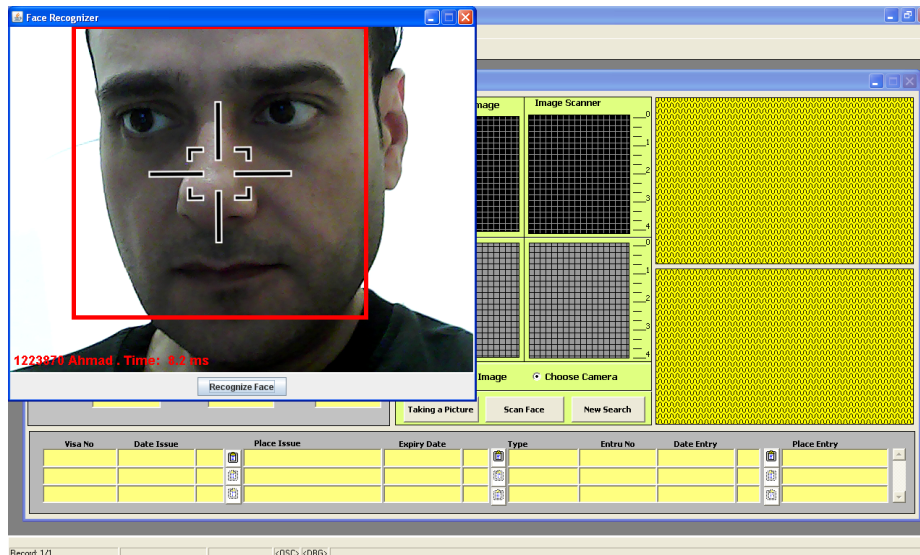


Figure 35 image will be scanned and stored in the database

When the option “choose image” is selected, the image will be scanned and stored in the database, this scanning process is shown above.

Browse existing images

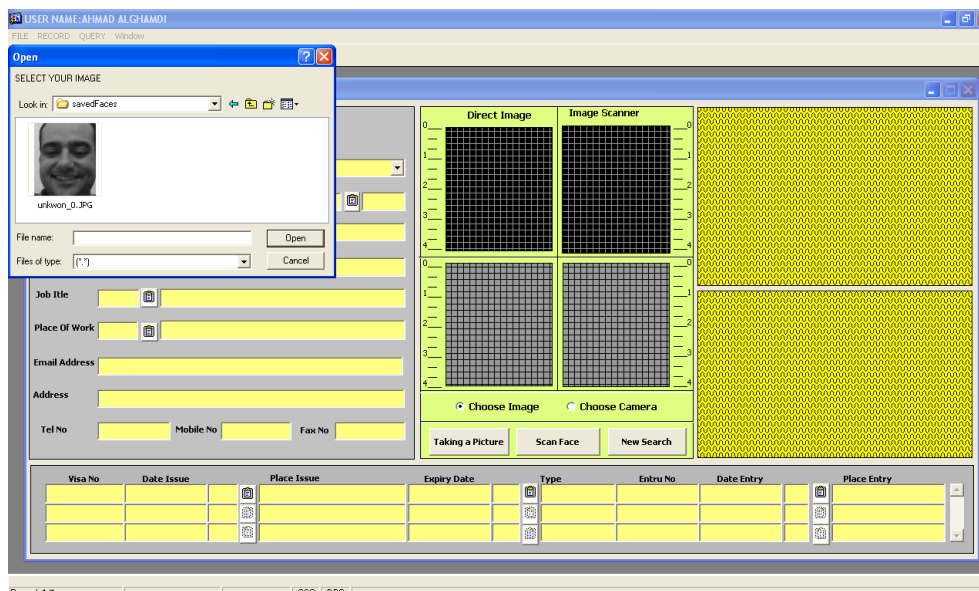


Figure 36 Browse existing images

The scanned image will be then selected from the various files present in the local computer using the browse options as above.

Details Matched



Immigration Screen

Id: 1001998881

Name: Ahmad Abdulrahman Alghamdi Sex: Male

Nationality: Saudi Type Of Blood: A+

Date Of Birth: 29/05/1980 Height: 165 Width: 85

Passport No: 100112 Place Of Issue: Jeddah

Job Title: Programmer

Place Of Work: Jeddah

Email Address: ahmad.a.ghamdi@hotmail.com

Address: Jeddah

Tel No: 0561121 Mobile No: 050712442 Fax No: 0561121

Image Scanner

Direct Image: [Image of a man's face]

Image Scanner: [Image of a man's face]

Choose Image: [X] Choose Camera: []

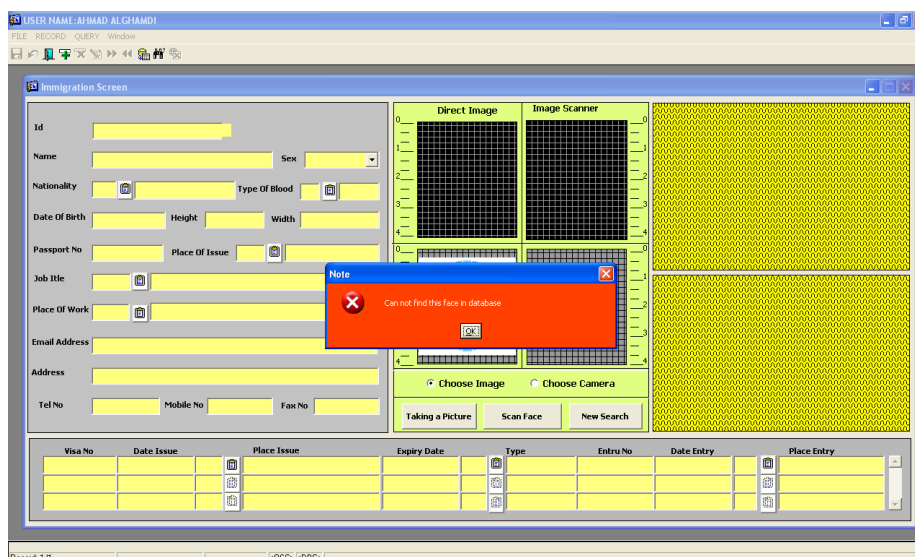
Taking a Picture: [] Scan Face: [] New Search: []

Visa No	Date Issue	Place Issue	Expiry Date	Type	Entru No	Date Entry	Place Entry
23344	29/10/2017	Jeddah	30/10/2020	TS	24455666		JEDDAH

Figure 37 Details Matched

Here in the above screen, image is chosen instead of capturing directly through camera. Even in this process there is match found in the recognition process.

Error messaging



Immigration Screen

Id: []

Name: [] Sex: []

Nationality: [] Type Of Blood: []

Date Of Birth: [] Height: [] Width: []

Passport No: [] Place Of Issue: []

Job Title: []

Place Of Work: []

Email Address: []

Address: []

Tel No: [] Mobile No: [] Fax No: []

Image Scanner

Direct Image: [Image of a man's face]

Image Scanner: [Image of a man's face]

Choose Image: [X] Choose Camera: []

Taking a Picture: [] Scan Face: [] New Search: []

Visa No	Date Issue	Place Issue	Expiry Date	Type	Entru No	Date Entry	Place Entry
23344	29/10/2017	Jeddah	30/10/2020	TS	24455666		JEDDAH

Note

Can not find this face in database

Figure 38 Error messaging

The error message has appeared as the captured face has not been found in the database

Police screen



The screenshot shows a web application window titled "USER NAME: AHMAD ALGHANDI". Inside, there's a "police Screen" window. The form on the left contains the following fields:

- Id:** 10019988771
- Name:** Ahmad Abdullah Alghandi, **Sex:** Male
- Nationality:** Saudi, **Type Of Blood:** A+
- Date Of Birth:** 21-MAY-1980, **Height:** 170, **Width:** 70
- Passport No:** F776273, **Place Of Issue:** Jeddah
- Job Title:** Student
- Place Of Work:** University
- Email Address:** ahmad.a.alghandi@hotmail.com
- Address:** 12 Royal Avenue, London W1 1HE
- Tel No:** 23304940, **Mobile No:** 7454613182, **Fax No:** 8773678
- Notes:** (Redacted)
- Reason:** (Redacted)

On the right, the "Face Recognition" section shows:

- Direct Image:** A photo of a man.
- Image Scanner:** A photo of the same man.
- Image Recognition:** Two photos of the man with a "Choose Image" button.
- Barcode:** 10019988771
- Buttons:** "Taking a Picture", "Scan Face", "New Search".

At the bottom, there's a green banner that says "Face Recognition Sytem" with two small face icons.

Figure 39 the police screen is displayed where the details are entered

In the above screen, the police screen is displayed where the details are entered in the input fields. Here "choose image" option is selected and match is found with the scanned image that is stored in the database. By using the marked function some notes can be added on the registered person as it was not in the image below



This screenshot is similar to Figure 39, but the "Notes" dropdown menu is open, showing the following options:

- None Notes
- There Notes
- Worked

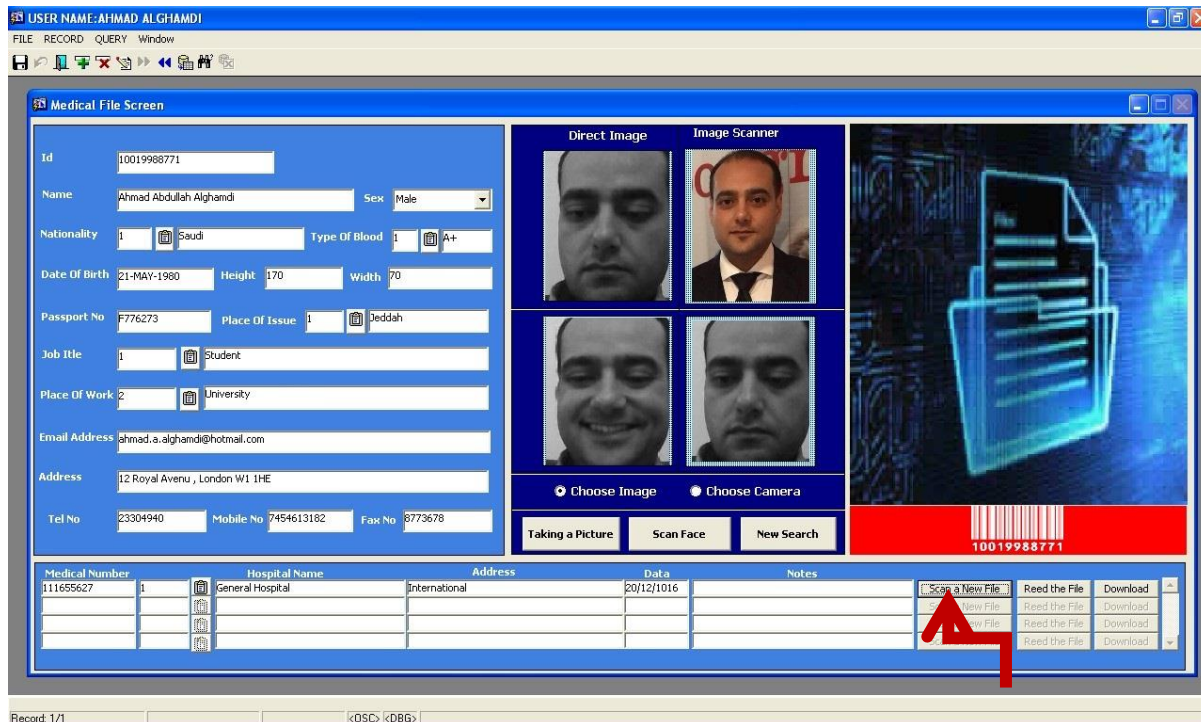
A red arrow points to the "Notes" field, indicating where the user can select an option.

Figure 40 various attributes related to the lookup table

The various attributes related to the lookup table associated with the “notes” field is shown above. Among these several options, one option can be selected instead of entering manually.

Medical screen

Details matched



USER NAME: AHMAD ALGHAMDI
 FILE RECORD QUERY Window

Medical File Screen

Id: 10019988771
 Name: Ahmad Abdullah Alghamdi Sex: Male
 Nationality: 1 Saudi Type Of Blood: 1 A+
 Date Of Birth: 21-MAY-1980 Height: 170 Width: 70
 Passport No: F776273 Place Of Issue: 1 Jeddah
 Job Title: 1 Student
 Place Of Work: 2 University
 Email Address: ahmad.a.alghamdi@hotmail.com
 Address: 12 Royal Avenue, London W1 1HE
 Tel No: 23304940 Mobile No: 7454613182 Fax No: 8773678

Direct Image Image Scanner

Choose Image Choose Camera

Taking a Picture Scan Face New Search

Barcode: 10019988771

Medical Number	Hospital Name	Address	Date	Notes
111655627	General Hospital	International	20/12/2016	

Record: 1/1 <OSC> <DBG>

Figure 41 Details matched

The same procedure works in case of the medical screen. Here after inputting all details either manually or through lookup tables, the matching process is done by comparing the scanned image and the actual image that is stored in the database. In this comparison process a match is being identified. In addition to it, by checking the above button the user will be able to scan a new medical file and the following screen will be shown for scanner connection

Scanning

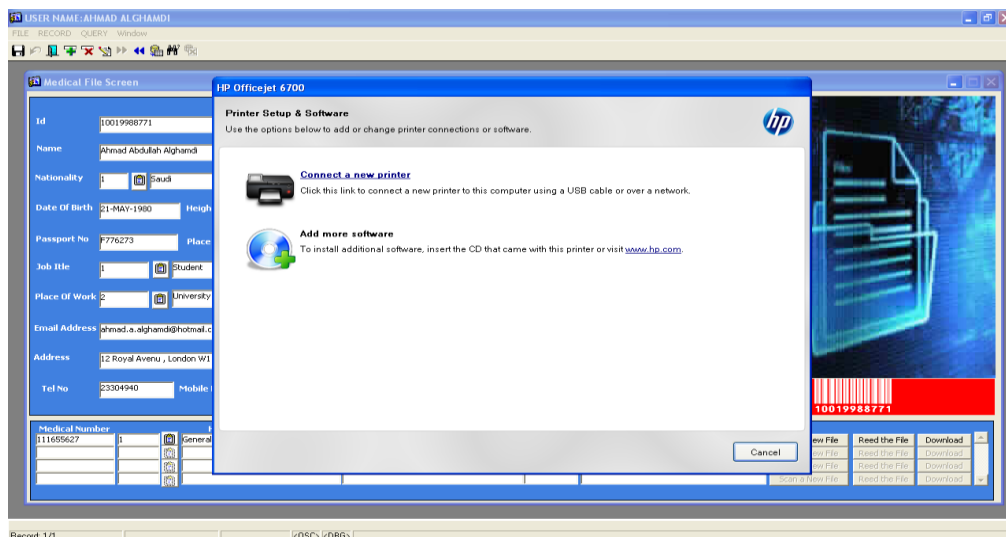


Figure 42 the supporting screen to connect will be printer

The medical file that is related to this user can be uploaded by scanning it. In the above screen the supporting screen to connect will be printer is given indicating that the scanning of the medical file is provided.

Viewing medical file

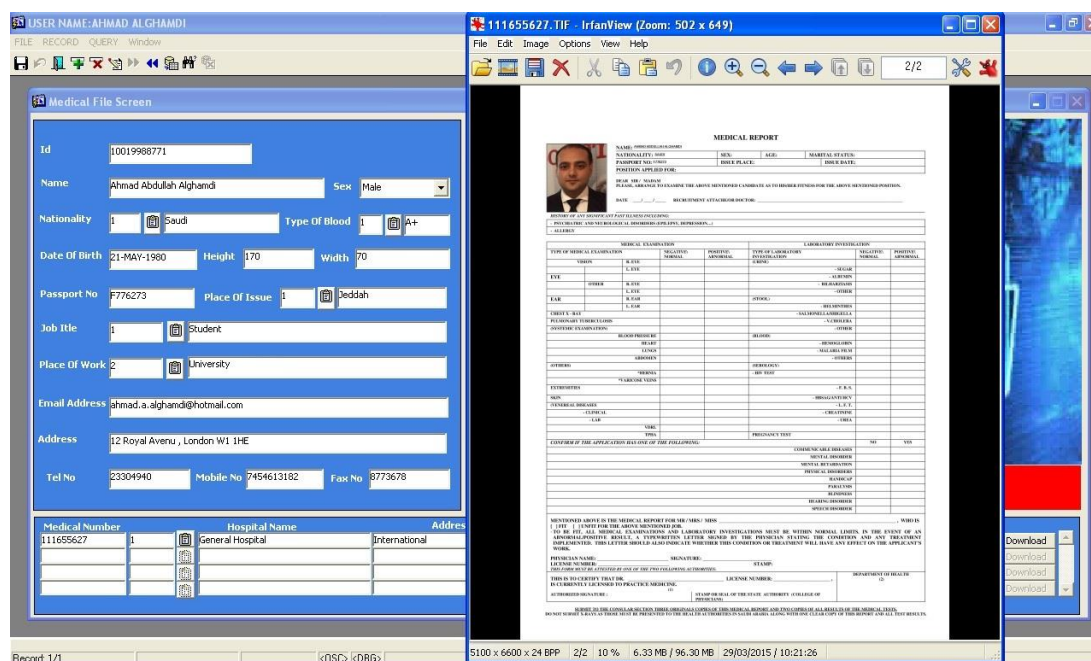


Figure 43 scanned medical file of the new user

The scanned medical file of the new user can be seen by this medical user as indicated in the above screen.

Download file

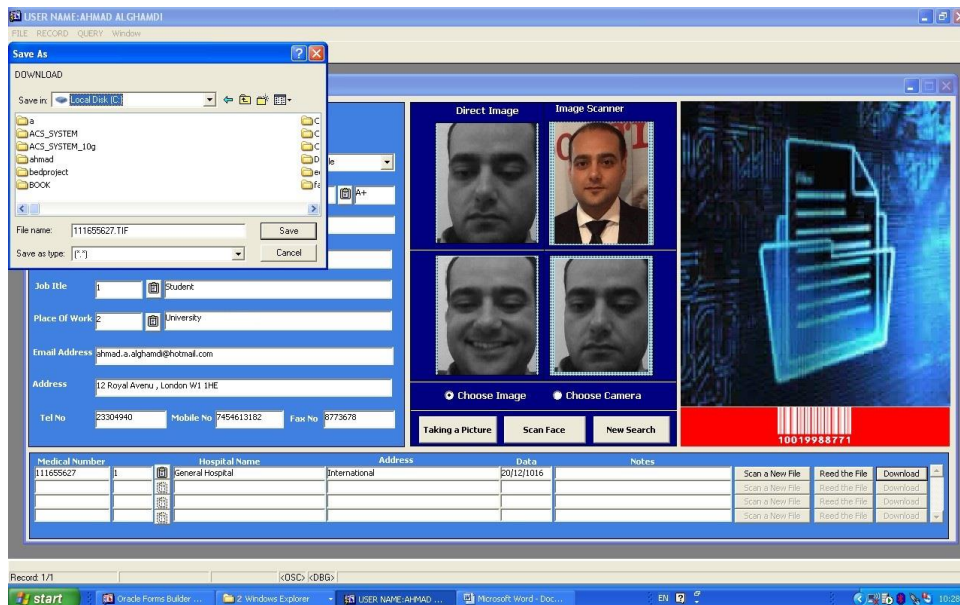


Figure 44 scanned medical file can also be downloaded

This scanned medical file can also be downloaded and the destination location of saving this file is indicated in the above screen.

Email screen

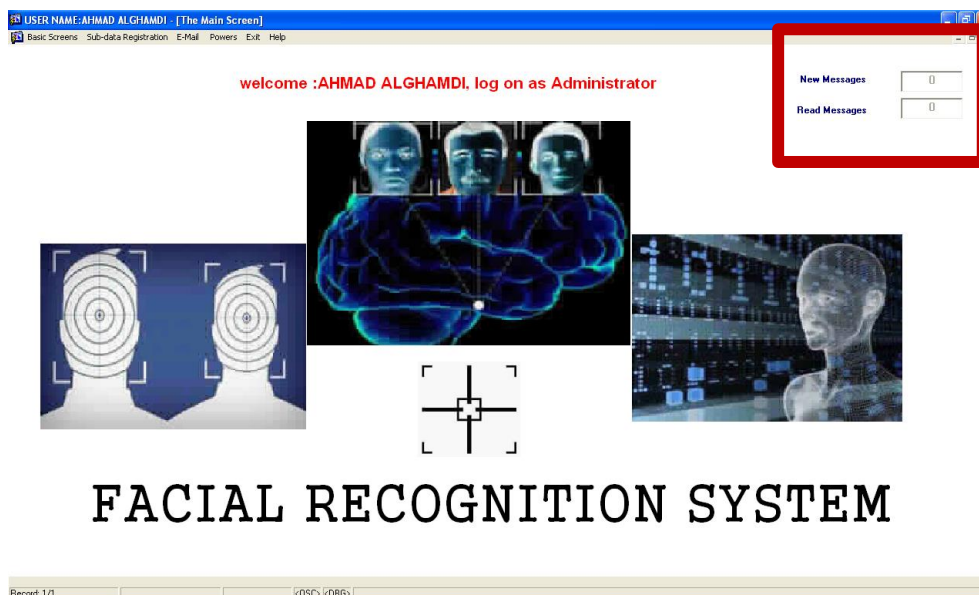


Figure 45 messages that are read can be identified

On the main screen, the number of messages that are new and the number of messages that are read can be identified as highlighted above.

Choosing receiver

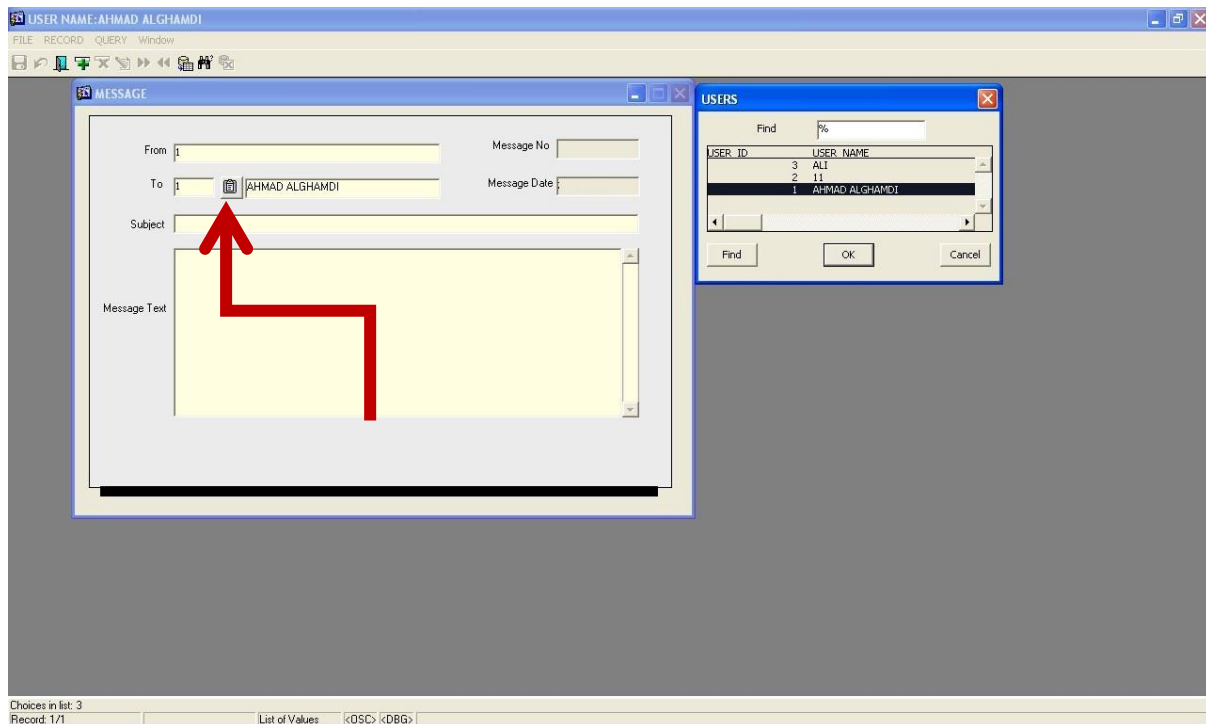


Figure 46 Choosing receiver

The logged in user is sending an email to the newly created user by using the lookup list provided for the receiver option. By checking the look up list, all the system's users' emails will be listed to choose from.

Writing the message

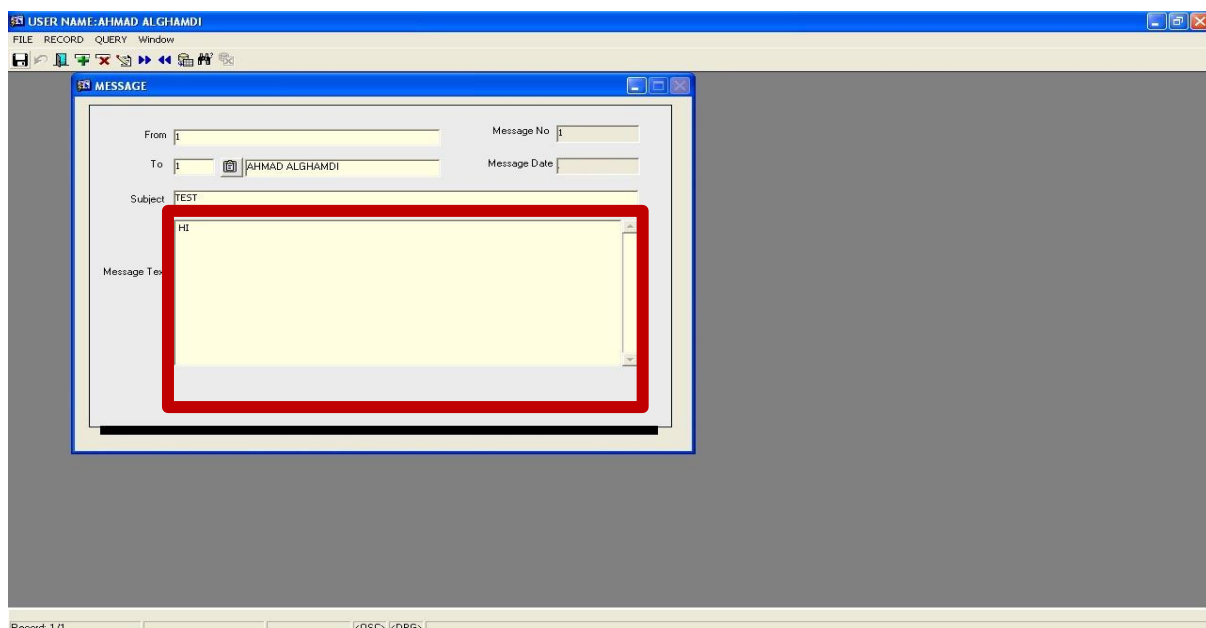


Figure 47 Writing the message

The actual message can be typed in the text box which is highlighted in the above screen.

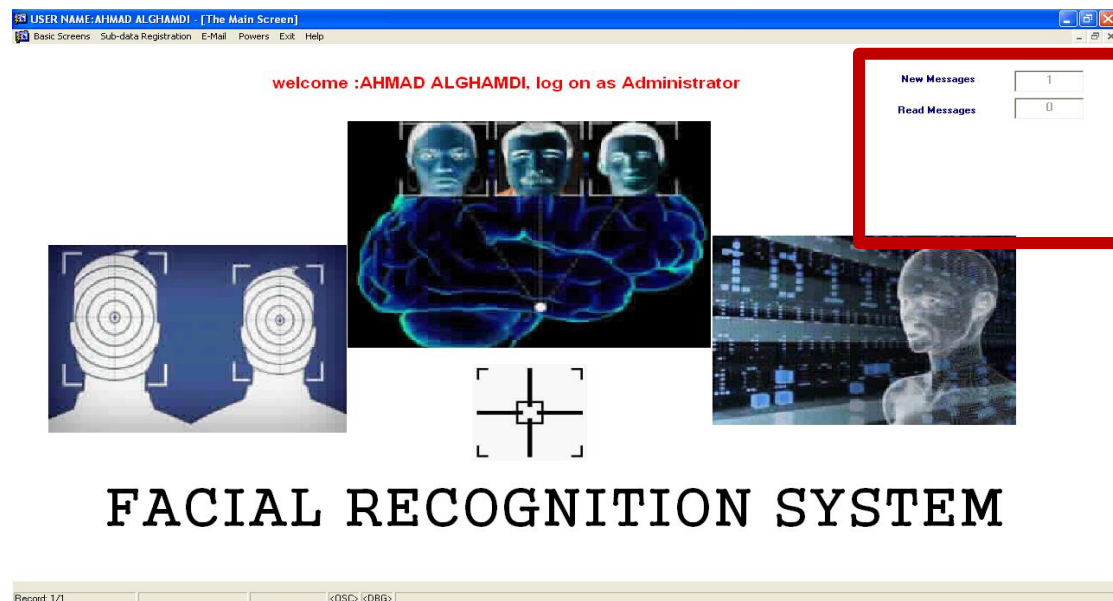


Figure 48 newly created user has received an email

When this newly created user has received an email, then it will be immediately shown up in the main screen and the new message option will be incremented to 1 as indicated in the above screen.

Inbox shown

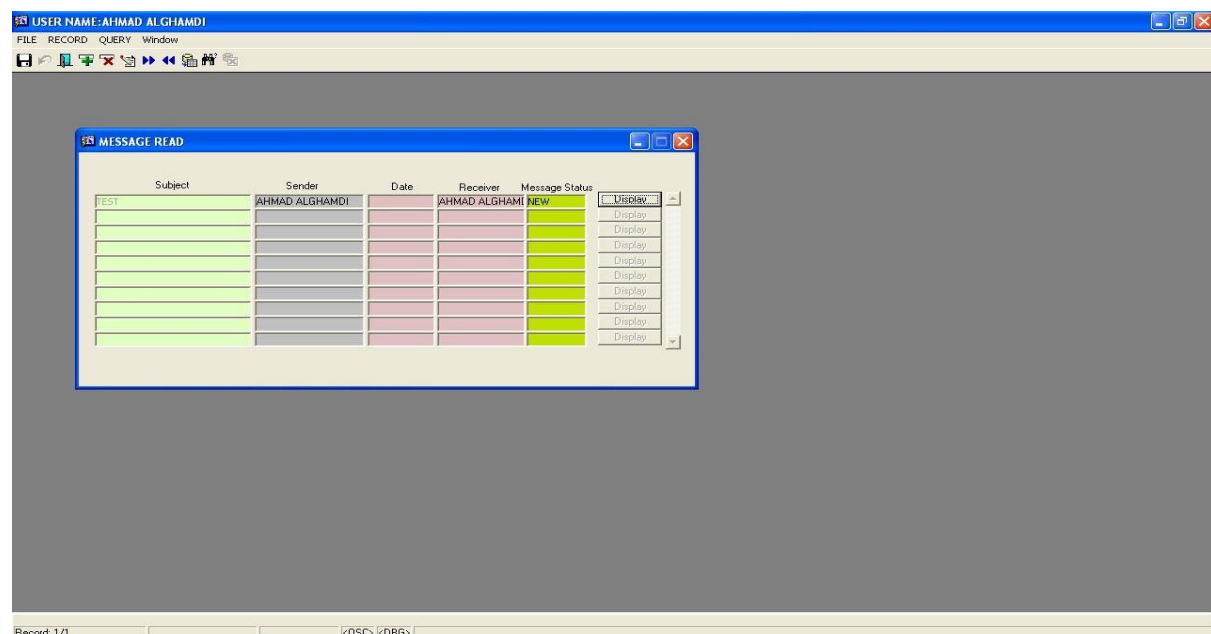


Figure 49 Inbox shown

The inbox of the newly created user showing the information of the newly received email is given in the above screen.

Reading the message

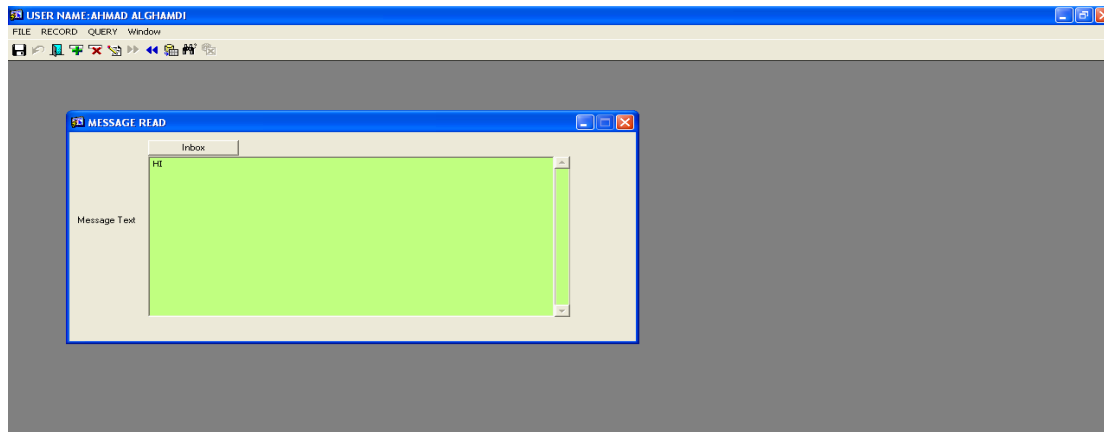


Figure 50 Reading the message

By clicking on the “display” button, this email received will be displayed as shown in the above screen.

Number of (read/unread) email shown

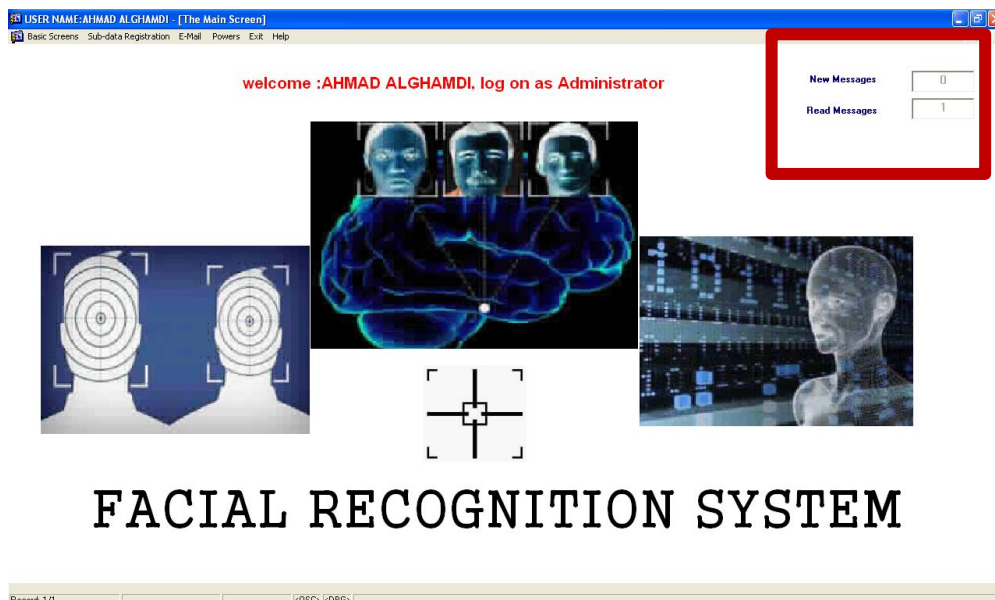


Figure 51 Number of (read/unread) email shown

When the message is read, immediately the values in the main screen will be changed where the read messages are increased to 1 and new message is decremented to 0.

Viewing read messages

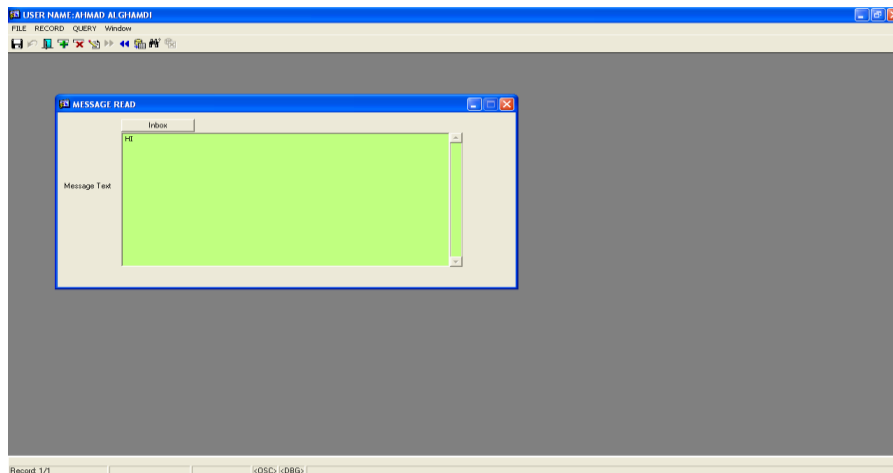


Figure 52 Viewing read messages

The read messages can be displayed again as shown in the above screen.

Admin screen

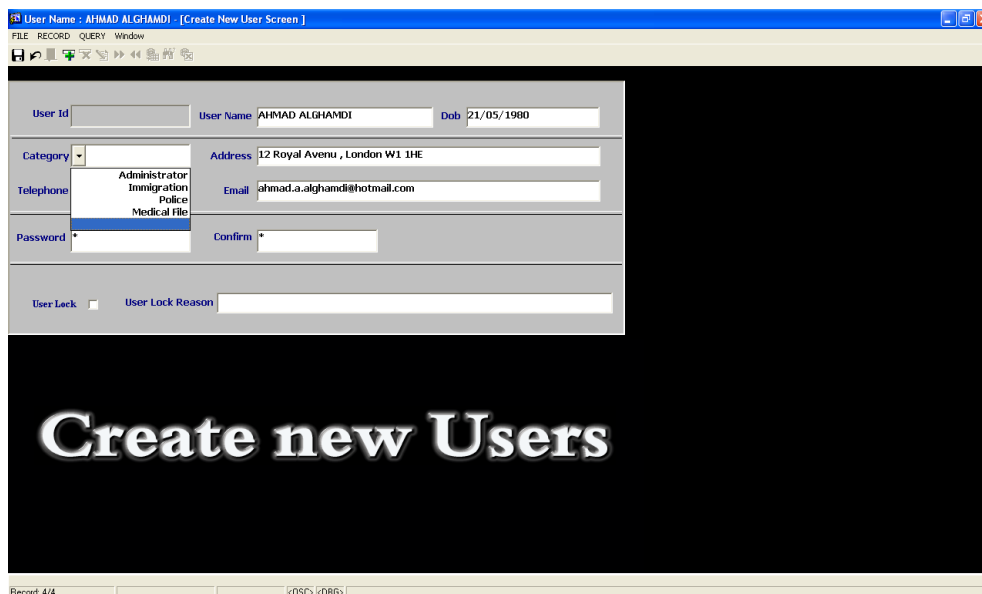


Figure 53 the admin is trying to open the account

In the admin screen, the admin is trying to open the account of the newly created user so that appropriate privileges can be assigned to him.

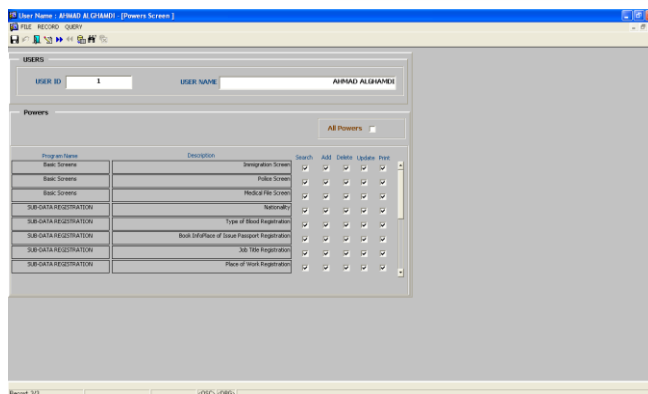


Figure 54 admin is trying to assign privileges

Here, the admin is trying to assign privileges to this newly created user by checking the appropriate check boxes.

6.3 Testing Search

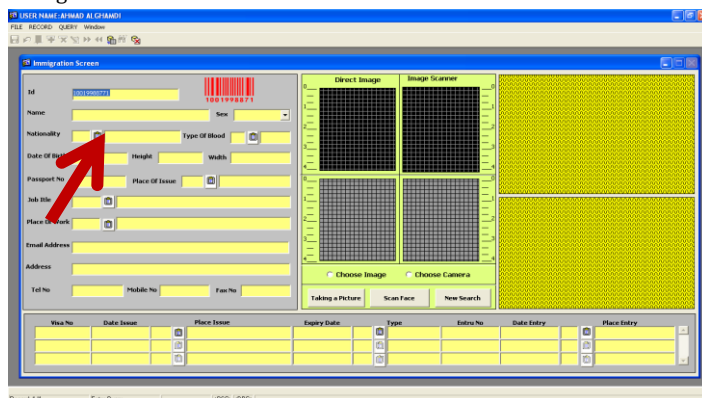


Figure 55 the information of that searched user

After inputting the ID the system can find the desired details based on the ID and it displays all the information of that searched user.



Figure 56 the details of the successfully searched

In the above screen, the details of the successfully searched user are displayed in a successful manner.

6.4 Comparison of Oracle with other databases

In this project, during the implementation of the photograph recognition system the training set and the weights calculated for the images in the training set will be stored in the Oracle database 10g. This oracle is a RDMS (Relational Database Management System) that consists of several features like data redaction for improving the security level for the sensitive data, new technique to handle the database in order to archive the Flash Data Archive, supporting the data pump for the sake of the database consolidation, enhancement to the Oracle Application express using which the web apps can be developed through SQL, PL/SQL and also provision of the advanced network compression method for enhancing the performance. A comparison between Oracle and the other databases which is specified below indicates that oracle is the most suitable and effective database for this application.

Features	Oracle	MySQL	SQL Server
Interface offered	GUI, SQL	SQL	GUI and SQL
Support to the languages	Several languages like C, C++, and C #, Objective C, Java and Ruby.	Several languages like C, C++, and C #, Objective C, Java and Ruby.	Python, PHP, Java, VB.Net and Ruby
Operating System	Window, HP-UX, Linux, OS X, Solaris	Windows, Solaris, FreeBSD, OS X, Linux	Only Windows operating system
Licensing	Proprietary	Open source	Proprietary
Built-in detection of database failure and the repair	Yes	Yes	No
Developer	Microsoft	Oracle	Oracle
Active clustering	Yes	No	No
Transparent nature of the application scalability	Yes	Yes	No

Table 1: Shows comparative analysis

Based on the comparative analysis given in the above table, it can be said that Oracle is better than the other databases which made in the selection of this database for this project.

6.5 Evaluation

Based on the experiments that I have done, the efficiency of the project developed is as following

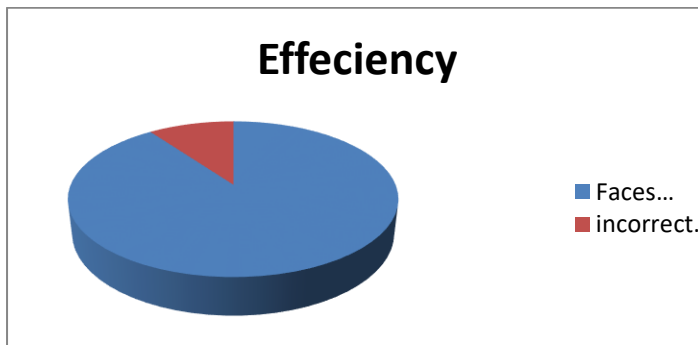


Figure 57 Evaluation

I have run the application that was developed on 20 images where the faces were matched correctly in 18 cases out of 20 and 2 were incorrect at the first attempt and that is due to the lighting and the camera accuracy which makes the efficiency 90% correct . However, as the application has another way of recognition which is matching images that have been saved on the system locally and the accuracy is 100% correct.

6.6 Summary

The detail of the photograph recognition system that is developed in this project is provided. The testing of the system is done and all the stages of running the system are explained clearly in this section. The working of the immigration screen, police screen and the medical screen is mentioned clearly in this section with appropriate screen shots.

Chapter 7 Conclusion

7.1 Conclusion

In the present world there is a high need of security where government organizations and the other business organizations need highly reliable techniques for identifying the individuals in an accurate manner without causing any damage to the privacy rights of individuals and also in recognizing the individuals in an effective manner. With the help of the proper recognition system an appropriate solution can be provided for this issue. In the literature large number of techniques is present to implement an efficient face recognition system. However, these methods use the human faces directly to recognise a match with the already stored images. In this project, the concept of the photograph recognition system is introduced where the input is provided in the form of photograph which is used in the recognition process.

In this photograph recognition system, initially the registration of a specific subject will be done to this system. For the registration the photography related to this subject are required and there must be more than one photograph for each subject. The presented photographs will be processed by the underlying algorithm to evaluate the quality of the photographs, to identify the key landmarks in the photograph like the position of the eye, position go the nose, distance between the eyes. The photograph will be future processes depending on the landmarks positions for the creation of a canonical image. Later the crucial biometric features will be extracted from this image for creating reference templates. The underlying algorithm used in this photograph recognition system is the Eigen face method in which the weights of the images are calculated and compared with the stored weight vector.

The design of this application and the Eigen face method is done using the unified modelling language so that it is suitable for the medical, immigration and the police applications. In the photograph recognition system that is implemented in this project capturing of the images will be done so as to provide the recognition. The use of java platform is done for capturing the required images of the user. The interface of the application is also designed through which the user can interact with the photograph recognition system and can provide the input details. The design and the development of this interface are done in such a way that the interface looks professional and also attractive to the users of medical, immigration and police applications. With the help of oracle builder form the interface of this photograph recognition system is developed. The images that are captured using java platform are required to be stored in a database and later they have to be retrieved when the recognition process takes place. For this purpose a database is used in this project which is oracle database version 10g. The selection of these software tools, java, oracle builder and oracle database are done in order to overcome any compatibility issues which can arise by selecting other incompatible software tools.

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