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Title of Minor Research Project

"To Develop Indian face database for Biometric Recognition of Face and Facial Expression"

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1. INTRODUCTION

The Face recognition as a combination of Image Processing and Pattern Recognition is still growing . Many papers are written and many real-world systems are being developed and Distributed . face recognition is a Biometric Recognition domain is attractive for national security purposes as well as for smaller scale surveillance systems. Biometric recognition refers to the automatic recognition of individuals based on their physical and/or behavioral characteristics [1] [2]. Humans intuitively use some body characteristics to recognize each other. Any human physiological or behavioral measurements can be used as a biometric characteristic if it satisfies the following requirements:

• universality : each person should have the characteristic.

• distinctiveness : each person should be sufficiently different in terms of the characteristic.

• permanence : the characteristic should be invariant over a period of time.

• collectability : the characteristic can be measured quantitatively. a practical system are also important

• performance : which refers to the recognition accuracy and speed.

• acceptability : it should be possible the use in every day life.

• circumvention : which indicates how easily the system can be fooled using fraudulent methods.

In order to be able to claim that any face recognition system is efficient, robust and reliable, it must undergo rigorous testing and verification, preferably on real-world datasets. In spite of many face databases currently available to researchers.

The AR database was collected at the Computer Vision Center in Barcelona, Spain in 1998 [3]. It contains images of 116 individuals (63 men and 53 women). The imaging and recording conditions (camera parameters, illumination setting, camera distance) were carefully controlled and constantly recalibrated to ensure that settings are identical across subjects. The resulting RGB color images are 768 × 576 pixels in size. The subjects were recorded twice at a 2–week interval. During each session 13 conditions with varying facial expressions, illumination and occlusion were captured.

The BANCA multi-modal database was collected as part of the European BANCA project, which aimed at developing and implementing a secure system with enhanced identification, authentication, and access control schemes for applications over the Internet [4]. The database was designed to test multimodal identity verification with various acquisition devices (high and low quality cameras and microphones) and under several scenarios (controlled, degraded, and adverse). Data were collected in four languages (English, French, Italian, Spanish) for 52 subjects each (26 men and 26 women). Each subject was recorded during 12 different sessions over a period of 3 months.

The CAS-PEAL (pose, expression, accessory, lighting) Chinese face database was collected at the Chinese Academy of Sciences (CAS) between August 2002 and April 2003.1 It contains images of 66 to 1040 subjects (595 men, 445 women) in seven categories: pose, expression, accessory, lighting, background, distance, and time [5]. For the pose subset, nine cameras distributed in a semicircle around the subject were used. Images were recorded sequentially within a short time period (2 seconds). In addition, subjects were asked to look up and down (each time by roughly 30◦) for additional recordings resulting in 27 pose images.

The CMU PIE database was collected between October and December 2000 [6]. It systematically samples a large number of pose and illumination conditions along with a variety of facial expressions The PIE database contains 41,368 images obtained from 68 individuals. The subjects were imaged in the CMU 3D Room. using a set of 13 synchronized high-quality color cameras and 21 flashes. The resulting RGB color images are 640 × 480 in size.

The Facial Recognition Technology (FERET) database was collected at George Mason University and the US Army Research Laboratory facilities as part of the FERET program, sponsored by the US Department of Defense Counterdrug Technology Development Program [7, 8]. The FERET and facial recognition vender test (FRVT) 2000 evaluations as well as independent evaluations [6] used the database extensively available for a range of research algorithms as well as commercial face recognition systems. The lists of images used in training, gallery, and probe sets are distributed along with the database, so direct comparisons of recognizer performance with previously published results are possible.

The Yale Face Database B [13] was collected to allow systematic testing of face recognition methods under large variations in illumination and pose. The subjects were imaged inside a geodesic dome with 64 computer-controlled xenon strobes. Images of 10 individuals were recorded under 64 lighting conditions in nine poses (one frontal, five poses at 12◦, and three poses at 24◦ from the camera axis). Because all 64 images of a face in a particular pose were acquired within about 2 seconds, only minimal changes in head position and facial expression are visible. The database is divided into four subsets according to the angle between the light source and the camera axis (12◦, 25◦, 50◦, 77◦). Hand-labeled locations of the eyes and the center of the mouth are distributed along with the database.

Indian face Database contains a set of face images taken in February, 2002 in the IIT Kanpur campus. There are eleven different images of each of 40 distinct subjects. For some subjects, some additional photographs are included. All the images were taken against a bright homogeneous background with the subjects in an upright, frontal position. The files are in JPEG format. The size of each image is 640x480 pixels, with 256 grey levels per pixel. The following orientations of the face are included: looking front, looking left, looking right, looking up, looking up towards left, looking up towards right, looking down. Available emotions are: neutral, smile, laughter, sad/disgust.

The JAFFE database contains 213 images of 10 Japanese female models obtained in front of a semi reflective mirror [10]. Each subject was recorded three or four times while displaying the six basic emotions and a neutral face. The camera trigger was controlled by the subjects. The resulting images have been rated by 60 Japanese women on a 5-point scale for each of the six adjectives. The rating results are distributed along with the images. The images were originally printed in monochrome and then digitized using a flatbed scanner.

The Cohn-Kanade AU-Coded Facial Expression Database is publicly available from Carnegie Mellon University [11]. It contains image sequences of facial expressions from men and women of varying ethnic backgrounds. The subjects perform a series of 23 facial displays that include single action units and combinations of action units. A total of 504 sequences are available for distribution. The camera orientation is frontal. Small head motion is present. There are three variations in lighting: ambient lighting, single-high-intensity lamp, and dual high-intensity lamps with reflective umbrellas. Facial expressions are coded using the facial action coding system [12] and assigned emotion-specified labels. Emotion expressions included happy, surprise, anger, disgust, fear, and sadness.

Images in those databases are mainly taken under strictly controlled conditions of lighting, pose, etc., and are of high resolution (high quality capturing equipment is used). Although some of the most frequently used databases have a standardized protocol (in order to assure reproducibility of results) all this is still far from real-world conditions. For real-world applications, algorithms should operate and be robust on data captured from video cameras (of various qualities) on a public place. Illumination should be uncontrolled (i.e. coming from a natural source) with varying direction and strength. Head pose should be as natural as possible. All this mimics a really complex imaging environment, such as is expected when building an airport security system or any other national security system. The obvious lack of such image sets is the main reason for a low number of studies on face recognition in such naturalistic conditions, resulting in very high recognition rates suggesting that face recognition is almost a solved problem. Some Databases are strictly dedicated for illumination, some for pose , or facial Expression with controlled condition or images taken from high resolution cameras. The law enforcement person identification from low quality surveillance images or any other identification scenario where the subjects cooperation is not expected. Recognizing how important this topic is, researchers are performing more and more experiments using CCTV (Closed Circuit Television) images, exploring performance of both humans and computers. This was the main motivation for collecting our database. Our database mimics the real-world conditions as close as possible.

Objectives of the developing the Database is to collect images with controlled and uncontrolled condition. Images of different illumination condition of a same subject. Images of different pose, angle , occlusion of a same subject. Images of different facial expression of a same subject such as happiness, sadness, anger, disgust, fear and surprise Using Digital camera, CCTV camera for capturing the images for better study of face and facial expression recognition.

I adopt the methodology for developing the Database as, In controlled condition subject seating in the chair with complete light condition(studio atmosphere) then taking the photograph for frontal position, then some angle left and right position for taking photograph as well as face up and Down direction. In uncontrolled condition photograph are taken in outdoor with natural light or direct in sunlight for frontal position, then some angle left and right position for taking photograph as well as face up and Down direction. Images (faces) collect from the same selected subject using CCTV camera for the training and testing of system for recognition subject to inform for giving various facial expression such as happiness, sadness anger, disgust , fear and surprise.

2. DATABASE DISCRIPTION

in different situation. In such a setup, one can easily imagine a scenario where an individual should be recognized comparing image of Pose , This database was designed mainly as a means of testing face recognition algorithms Expression , Illumination as well as low quality video surveillance still image. In order to achieve a realistic setup we decided to use high resolution Digital camera , commercially available surveillance cameras of varying quality (see Appendix for details).

2.1. Using digital camera

We have use Sony Digital camera (DXC-Hx 300v) of 20 Mega pixel for Different Pose , Illumination variation and different Facial Expression.

2.1.1. Pose

In controlled condition subject seating in the chair with complete light condition (studio atmosphere) as shown in fig.1. then taking the photograph for frontal position, then subject chair rotates on different angles. The subject left of angle 90 , 75, 60, 45, 30, 15, 0 degree from Front and then same procedure from right position for same degree of angle for taking photograph. The same procedure for face up and Down directions. Total 13 Frontal face images for single subject, 13 up directional face images for single subject and 13 down directional face images for single subject. So 13 + 13 + 13 = 39 face images for

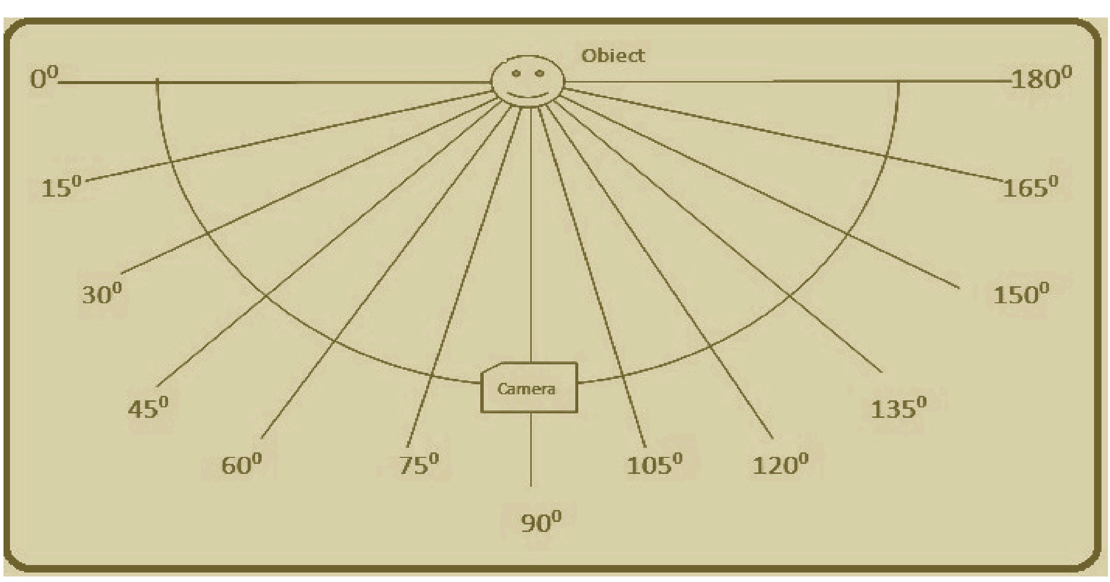

Fig.1. Methodology use for pose images

pose of single person/subject. Fig.2 shows the images of frontal direction . Fig.3. shows the images of up direction and Fig.4. shows the images of down direction

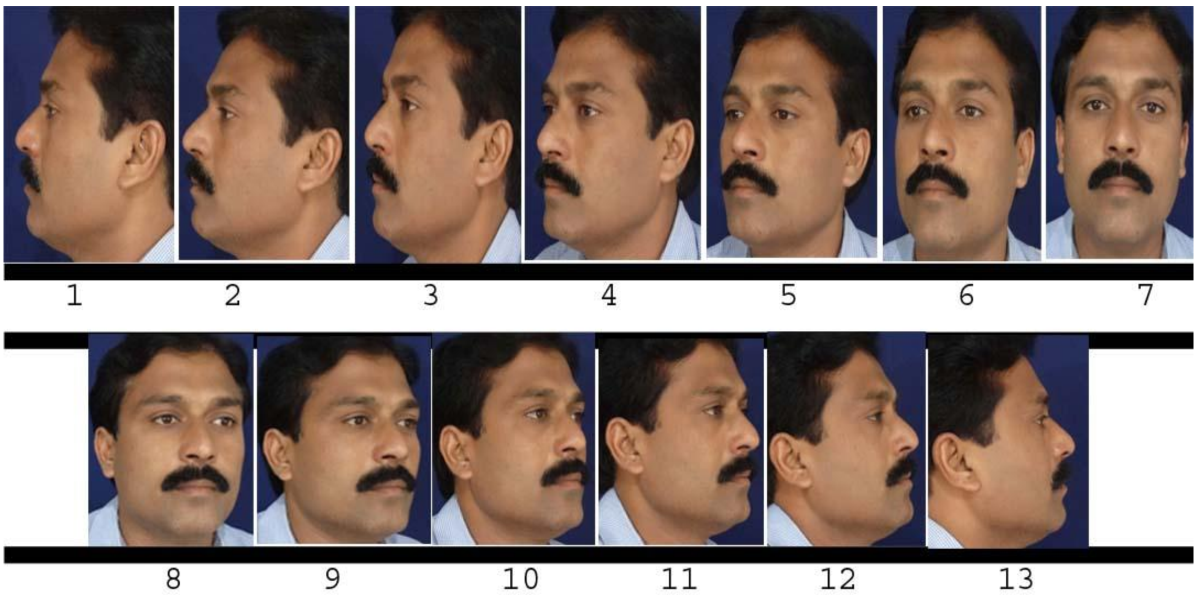

Fig.2. Pose Front

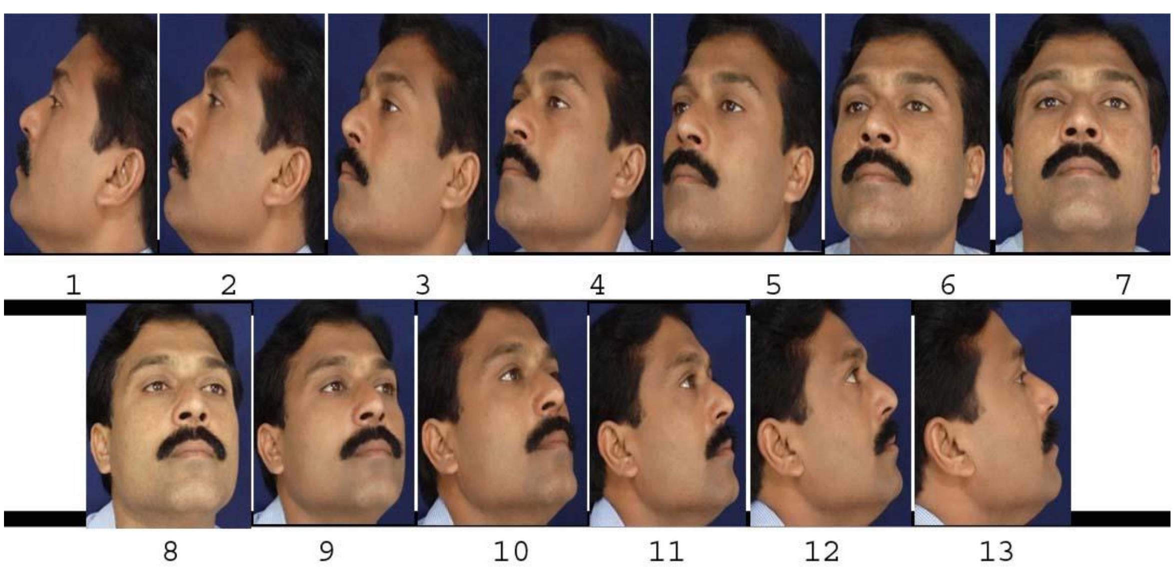

Fig.3. Pose Up

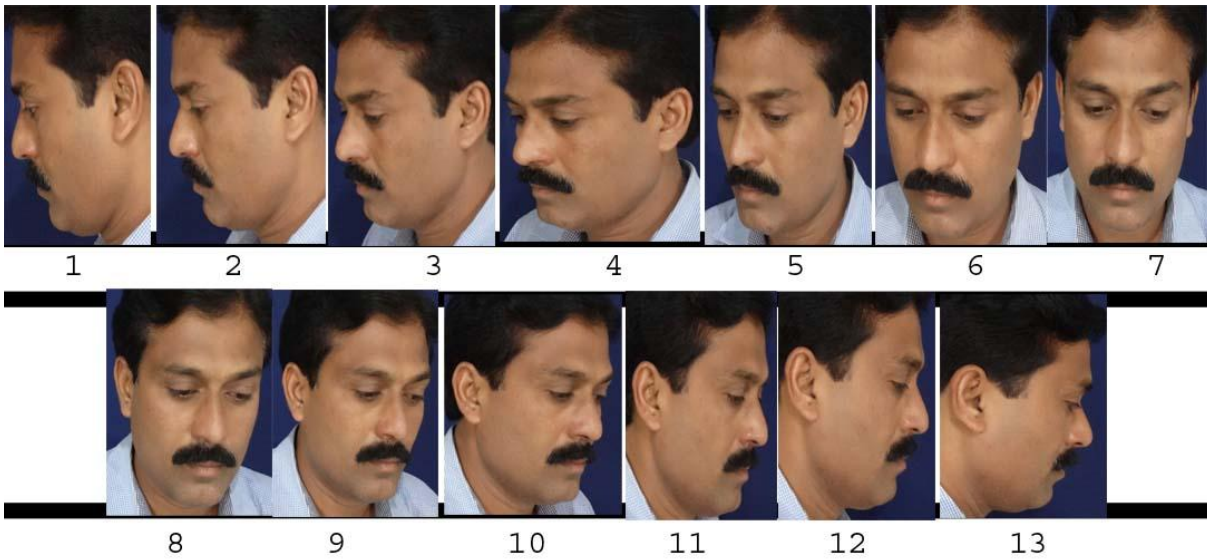

Fig.4. Pose Down

2.1.2. Illumination

In illumination condition setup is similar use in pose . Subject seating in the chair with complete dark condition, except the one CFL bulb (35 Watt) . Taking the photograph for frontal position, only the bulb rotates on different angles. The subject left of angle 90 , 75, 60, 45, 30, 15, 0 degree from Front and then same procedure from right position for same degree of angle of bulb for taking photograph. Face Images collected from left to right direction with angle variation of light effects. And 2 images from up and down light source. All images collect from single light source of CFL bulb. Total 15 face images of single subject. Fig.5. shows the images of illumination.

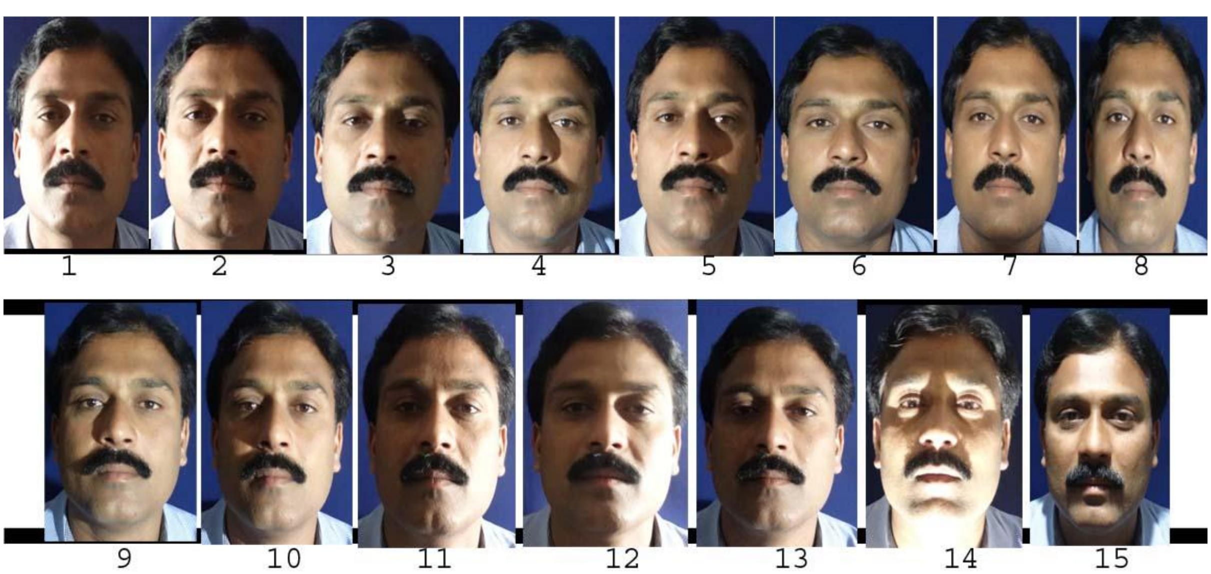

Fig.5. Illumination

2.1.3. Expression

In controlled condition subject to inform for giving various facial expression such as neutral , happiness, sadness, anger, contempt , fear and surprise. We have collect the 1 neutral expression and 2 images for each expression. Total 15 face images of single subject for facial expressions. Fig.6. shows the images of expression.

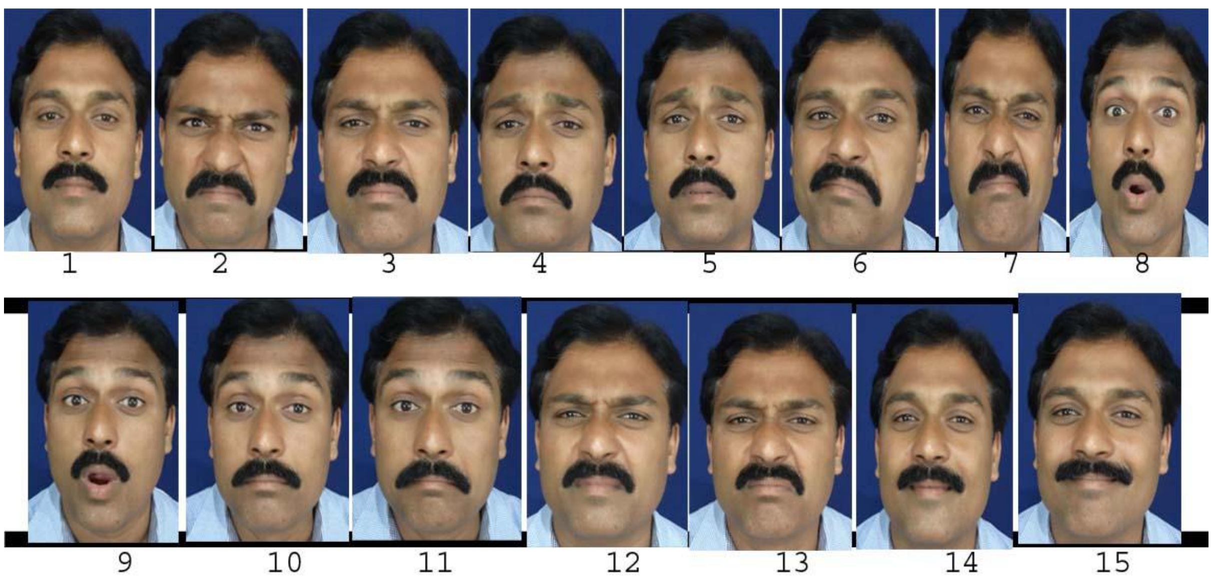

Fig.6. Expression

2.2. Using CCTV Camera

CCTV Camera are used for surveillance purposes on different situation and or different places . In face recognition scenario one can match image of surveillance camera to available database with image. In this scenario number of application area like border cross checking , Airport entry checking as well as Police department application to detect the suspect using the CCTV footage. Here we adopt the same methodology for capturing the images from CCTV camera as like capturing the images in real world situation. Capturing face images took place in Department of Computer Science , Arts ,Commerce and Science College , Kirannagar Amravati. Maharashtra. Capture equipment included: surveillance cameras, professional digital video surveillance recorder, and a computer. For surveillance camera image acquisition surveillance cameras were installed in Corridor at the height of 2 meter and positioned as illustrated in Fig. 7. The only source of illumination was the outdoor sun light. The surveillance cameras were able to record in IR night vision mode as well. The Same camera was installed in a separate, darkened room for capturing IR images.

It was installed at a fixed position and Person standing in front of the camera with five different distances like 1, 2 ,3 ,4 ,5 meter from the camera. The IR part of the database is important since there are research efforts in this direction.

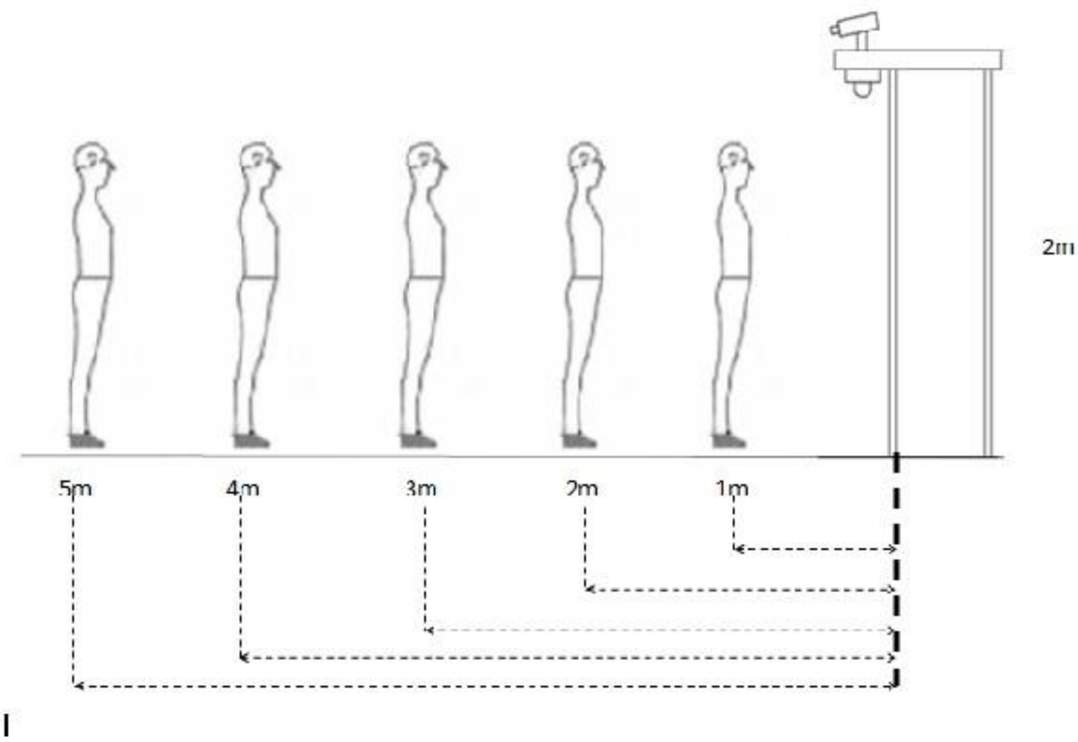

Fig.7.

2.2.1. Outdoor condition

For surveillance camera image acquisition in outdoor condition, 700 TVL surveillance cameras was installed in Corridor at the height of 2 meter and positioned as illustrated in Fig. 7. The only source of illumination was the outdoor sun light. This sun light is adequate for capturing the image with real world type situation . The person walk through the camera and standing each distances like 1, 2, 3, 4, 5 meter . The person move his neck from left to right and from upward direction to the downward direction. Recording of the camera video streams on internal hard disk. For storage of images and for controlling surveillance camera we used 4 channel Digital recorder with adequate software provided from manufacturer for connecting and controlling over personal computer. Settings recommended by the vendor were used for capturing images on Digital recorder, because those settings represent most commonly used parameters set up in real life surveillance systems connected to a professional digital video surveillance recorder. We have collect 5 face images from each distances from camera with frontal , left , right , up and down directions of pose randomly. So each distance has 5 face images of single subject. Total face images of five distances is 25. The captured images is converted into RGB to Gray scale and then manually cropped and resize with 100 x 125 pixels. The Actual frame size of 700 TVL CCTV camera was 704 x 576 pixels. The images of one meter distance is clear but the distance is increases the images is degraded ,but the resolves the recognition problem for surveillance purpose. images shown in fig.8.

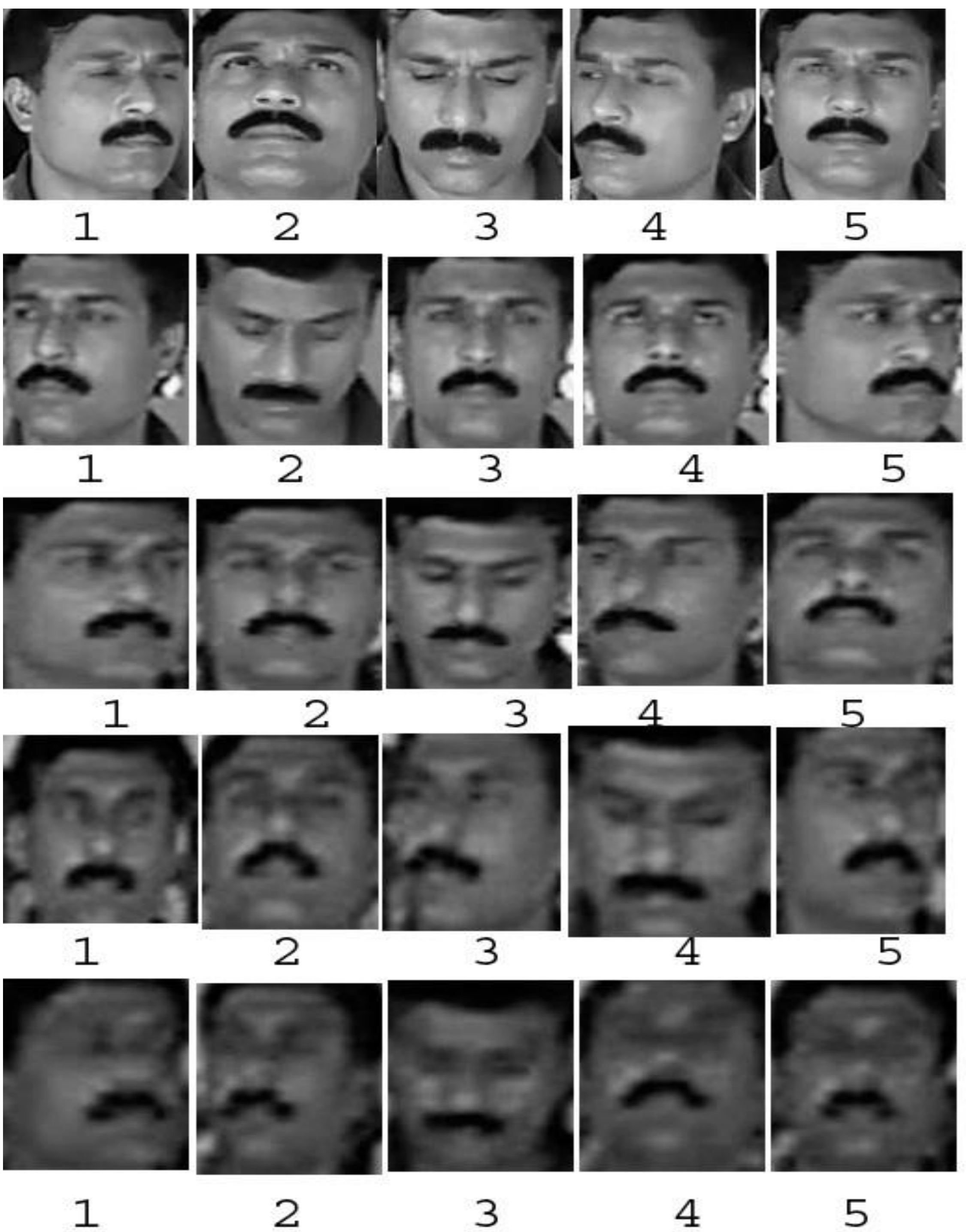

Fig.8. CCTV Outdoor

2.2.2 Indoor Infrared condition

We adopt the image acquisition procedure same as the outdoor condition, only difference is using the separate dark room for the same setup. We have collect 5 face images from each distances from camera with frontal , left , right , up and down directions of camera 700 TVL in indoor infrared condition. So total 25 face images of single subject as shown in fig.9. Also all images are cropped from original frames of videos with unique size 100 x 125 pixel

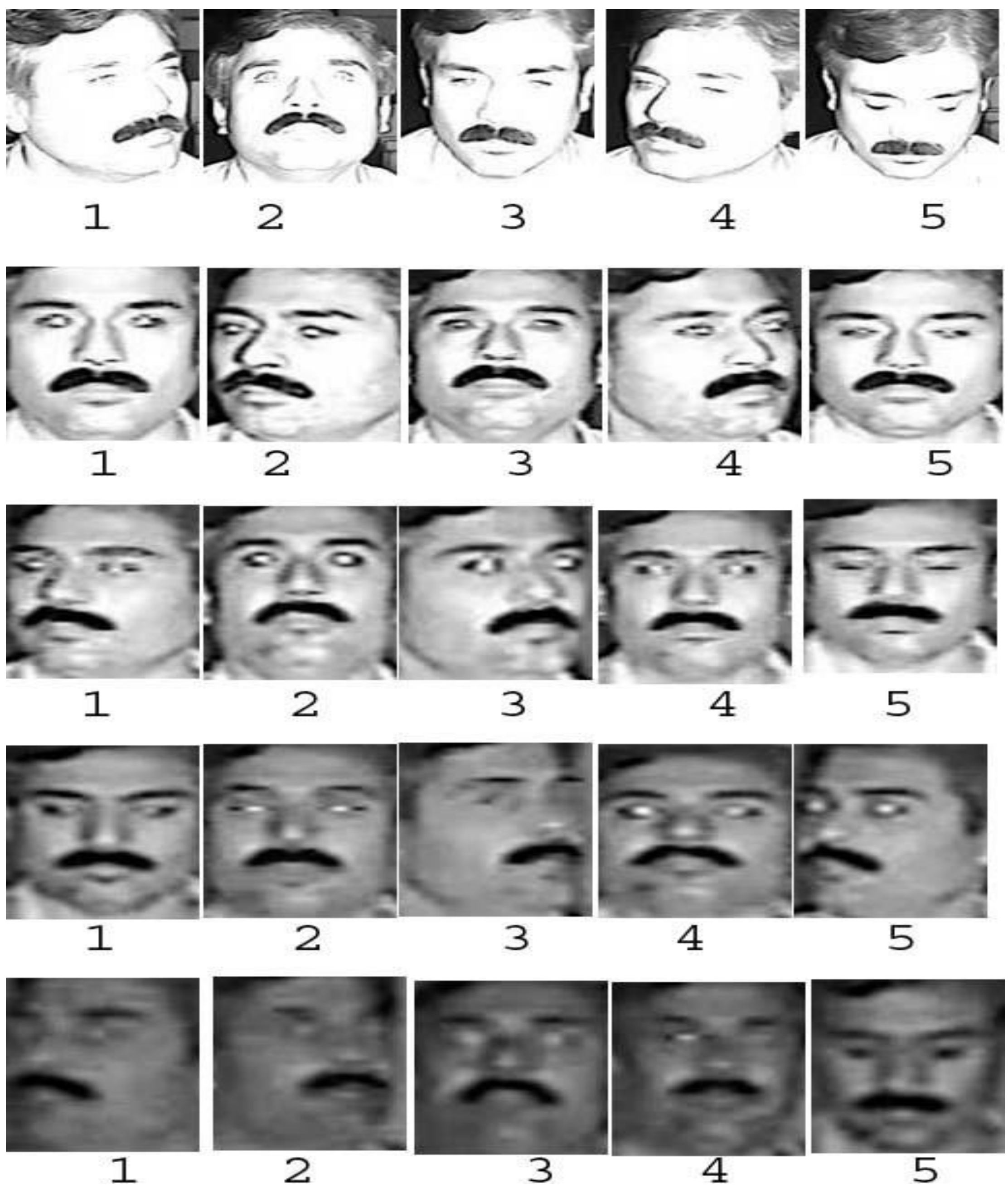

Fig.9. CCTV Indoor

2.3. Database demographics

The participants in this project were students, professors and employees at the Arts ,Commerce and Science College, Kirannagar Amravati. Maharashtra.

Total of 140 volunteers of males and females was participated. All participants were Indian, between the ages of 18 and 45.

3. POTENTIAL USES OF THE DATABASE

The most important potential use of this database is to test the face recognition algorithm’s robustness in a real-world scenario. As well as the same database solves the face recognition problem occur in Pose, Illumination and Expression. Using the area of emotional recognition or facial expression recognition the this database helps In such a setup a face recognition system should recognize a person by comparing an image captured by a surveillance camera to the image stored in a database. If we postulate a law enforcement use as the most potential scenario, this database image, to which the surveillance image is compared to, is a high quality full frontal facial mug shot. We would specifically like to encourage researchers to explore more deeply the small sample size problem (more dimensions than examples). Having one frontal mug shot per subject in our database addresses this issue adequately. It remains to be seen how will face recognition algorithms perform in such difficult conditions and how does the quality of capturing equipment and subject’s distance from camera influence the results. There is also a potential to test various image preprocessing algorithms (enhancing image quality by filtering techniques), as some of these surveillance images are of extremely low quality and resolution. By including different pose images of subjects, we made it possible to use this database in face modeling and 3D face recognition. Other potential uses of this database include but are not restricted to: evaluation of head pose estimation algorithms, evaluation of face recognition algorithms robustness to different poses, evaluation of natural illumination normalization algorithms, indoor face recognition (in uncontrolled environment), low resolution images influence, etc.

4. PRINCIPAL COMPONENT ANALYSIS

Mathematically, principal component analysis approach will treat every image of the training set as a vector in a very high dimensional space. The eigenvectors of the covariance matrix of these vectors would incorporate the variation amongst the face images. Now each image in the training set would have its contribution to the eigenvectors (variations). This can be displayed as an ‘eigenface’ representing its contribution in the variation between the images. These eigenfaces look like ghostly images . In each eigenface some sort of facial variation can be seen which deviates from the original image.

The high dimensional space with all the eigenfaces is called the image space (feature space). Also, each image is actually a linear combination of the eigenfaces. The amount of overall variation that one eigenface counts for, is actually known by the eigenvalue associated with the corresponding eigenvector. If the eigenface with small eigenvalues are neglected, then an image can be a linear combination of reduced no of these eigenfaces. For example, if there are M images in the training set, we would get M eigenfaces. Out of these, only M' eigenfaces are selected such that they are associated with the largest eigenvalues. These would span the M'- dimensional subspace 'face space' out of all the possible images (image space).

When the face image to be recognized (known or unknown), is projected on this face space (fig.10.), we get the weights associated with the eigenfaces, that linearly approximate the face or can be used to reconstruct the face. Now these weights are compared with the weights of the known face images so that it can be recognized as a known face in used in the training set. In simpler words, the Euclidean distance between the image projection and known projections is calculated; the face image is then classified as one of the faces with minimum Euclidean distance.

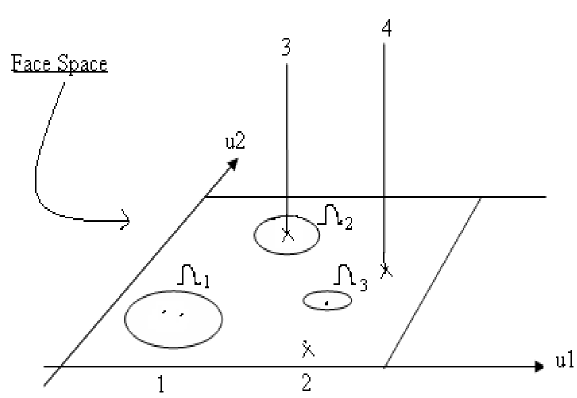

Fig. 10. (The face space and the three projected images on it. Here u1 and u2 are the eigenfaces. The projected face from the training database.)

4.1 Mathematical calculations.

Let a face image I(x,y) be a two dimensional N by N array of (8-bit) intensity values. An image may also be considered as a vector of dimension N2, so that a typical image of size 256 by 256 becomes a vector of dimension 65,536 or equivalently a point in a 65,536-dimensional space. An ensemble of images, then, maps to a collection of points in this huge space. Principal component analysis would find the vectors that best account for the distribution of the face images within this entire space.

Let the training set of face images be T1,T2,T3,….TM. This training data set has to be mean adjusted before calculating the covariance matrix or eigenvectors. The average face is calculated as-

$$\Psi = (1/M)\ \Sigma 1MTi$$

Each image in the data set differs from the average face by the vector

$$\Phi = Ti - \Psi.$$

This is actually mean adjusted data. The covariance matrix is

$$C = (1/M)\ \Sigma\ 1M\ \Phi i\ \Phi iT \qquad (1)$$

$$= AAT$$

where A = [Φ1, Φ2, …. ΦM]. The matrix C is a N2 by N2 matrix and would generate N2 eigenvectors and eigenvalues. With image sizes like 256 by 256, or even lower than that, such a calculation would be impractical to implement.

A computationally feasible method was suggested to find out the eigenvectors. If the number of images in the training set is less than the no of pixels in an image (i.e M < N2), then we can solve an M by M matrix instead of solving a N2 by N2 matrix. Consider the covariance matrix as ATA instead of AAT. Now the eigenvector vi can calculated as follows,

$$ATAvi = \mu ivi \qquad (2)$$

where μi is the eigenvalue. Here the size of covariance matrix would be M by M.Thus we can have m eigenvectors instead of N2. Premultipying equation 2 by A, we have

$$AATAvi = \mu i\ Avi \qquad (3)$$

The right hand side gives us the M eigenfaces of the order N2 by 1. All such vectors would make the image space of dimensionality M.

4.2 Face Space

As the accurate reconstruction of the face is not required, we can now reduce the dimensionality to M' instead of M. This is done by selecting the M' eigenfaces which have the largest associated eigenvalues. These eigenfaces now span a M'-dimensional subspace instead of N2.

4.3 Recognition

A new image T is transformed into its eigenface components (projected into 'face space') by a simple operation,

$$wk = ukT (T - \psi) \qquad (4)$$

here k = 1,2,….M'. The weights obtained as above form a vector ΩT = [w1, w2, w3,…. wM'] that describes the contribution of each eigenface in representing the input face image. The vector may then be used in a standard pattern recognition algorithm to find out which of a number of predefined face class, if any, best describes the face. The face class can be calculated by averaging the weight vectors for the images of one individual. The face classes to be made depend on the classification to be made like a face class can be made of all the images where subject has the spectacles. With this face class, classification can be made if the subject has spectacles or not. The Euclidean distance of the weight vector of the new image from the face class weight vector can be calculated as follows,

$$\varepsilon k = || \Omega - \Omega k|| \qquad (5)$$

where Ωk is a vector describing the kth face class. Using Euclidean distance or Cityblock Distance , Mahalanobis cosine distance formula, face is classified as belonging to class k when the distance εk is below some threshold value θε. Otherwise the face is classified as unknown. Also it can be found whether an image is a face image or not by simply finding the squared distance between the mean adjusted input image and its projection onto the face space.

$$\varepsilon 2 = || \Phi - \Phi f || \qquad (6)$$

where Φf is the face space and Φ = Ti – Ψ is the mean adjusted input.

With this we can classify the image as known face image, unknown face image and not a face image.

5. ARRANGEMENT OF DATABASE

The Database is arranged in one main folder name as NC-Face Database (NarasammaCollege – Face) . (Saved in DVD media) In this folder Two subfolder names is as follows.

1. CCTV-Camera(indoor-outdoor)
   a. CCTV-Indoor
      - Folder Have name 1,2,3,…144. is a subject
        - Each subfolder have name 1,2,3,4,5 is a distance in meter of image acquisition
          - Each Subfolder have image name with extension jpg 1.jpg, 2.jpg, 3.jpg, 4.jpg, 5.jpg

   b. CCTV-Outdoor
      - Folder Have name 1,2,3,…144. is a subject
        - Each subfolder have name 1,2,3,4,5 is a distance in meter of image acquisition
          - Each Subfolder have image name with extension jpg 1.jpg, 2.jpg, 3.jpg, 4.jpg, 5.jpg

2. Digital-Camera
   a. Pose-Up
      - Folder Have name 1,2,3,…160. is a subject
        - Each Subfolder have image name with extension jpg i.e 1.jpg, 2.jpg, 3.jpg, 4.jpg, 5.jpg, 6.jpg, 7.jpg, 8.jpg, 9.jpg, 10.jpg, 11.jpg, 12.jpg, 13.jpg.

   b. Pose-Down
      - Folder Have name 1,2,3,…160. is a subject
        - Each Subfolder have image name with extension jpg i.e 1.jpg, 2.jpg, 3.jpg, 4.jpg, 5.jpg, 6.jpg, 7.jpg, 8.jpg, 9.jpg, 10.jpg, 11.jpg, 12.jpg, 13.jpg.

   c. Pose-Front

Folder Have name 1,2,3,…160. is a subject

Each Subfolder have image name with extension jpg i.e 1.jpg, 2.jpg, 3.jpg, 4.jpg, 5.jpg, 6.jpg, 7.jpg, 8.jpg, 9.jpg, 10.jpg, 11.jpg, 12.jpg, 13.jpg.

d. Expression

Folder Have name 1,2,3,…160. is a subject

Each Subfolder have image name with extension jpg i.e 1.jpg, 2.jpg, 3.jpg, 4.jpg, 5.jpg, 6.jpg, 7.jpg, 8.jpg, 9.jpg, 10.jpg, 11.jpg, 12.jpg, 13.jpg, 1 4.jpg, 15.jpg,

e. Illumination

Folder Have name 1,2,3,…160. is a subject

Each Subfolder have image name with extension jpg i.e 1.jpg, 2.jpg, 3.jpg, 4.jpg, 5.jpg, 6.jpg, 7.jpg, 8.jpg, 9.jpg, 10.jpg, 11.jpg, 12.jpg, 13.jpg, 1 4.jpg, 15.jpg,

6. EXPERIMENTS

Using of baseline algorithm PCA on different parts of our database the results are good and need to use different set from this databases

6.1. Pose

Using PCA on pose images for Front images of only 20 subject. Image no. 1,2 ,3,4,5,6,7 for training and images 8,9,10,11,12,13 for testing images as shown in fig.2. Here recognition is left side pose images to right side pose images. All the images are converted in gray scale with size 200 x 150. The rank one recognition rate will be 12.50% , with equal error rate equals 39.17% .

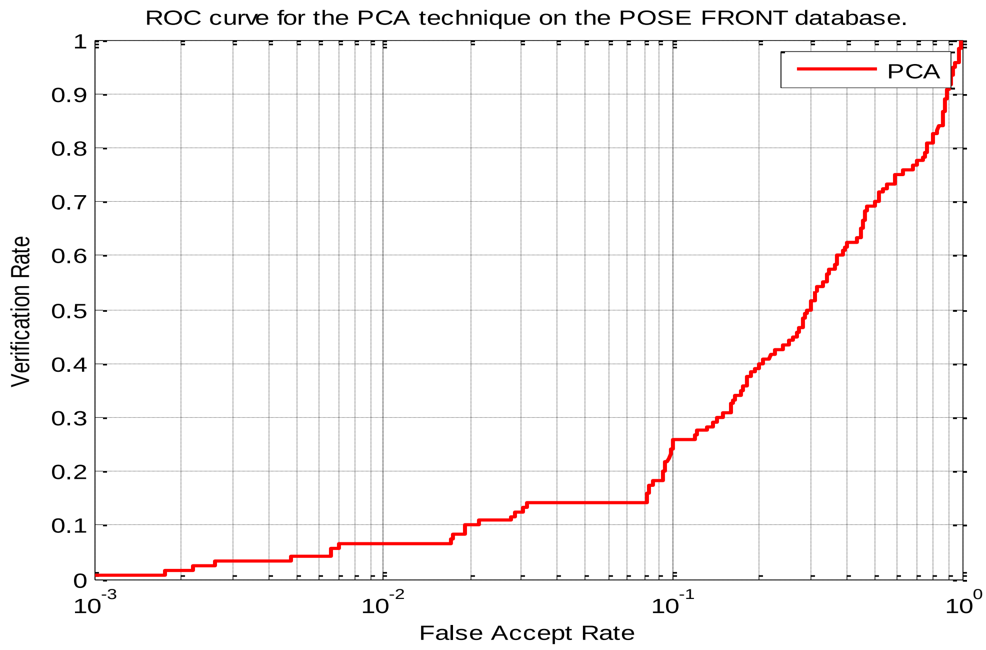

Fig.11. The ROC curve for PCA on POSE –Front

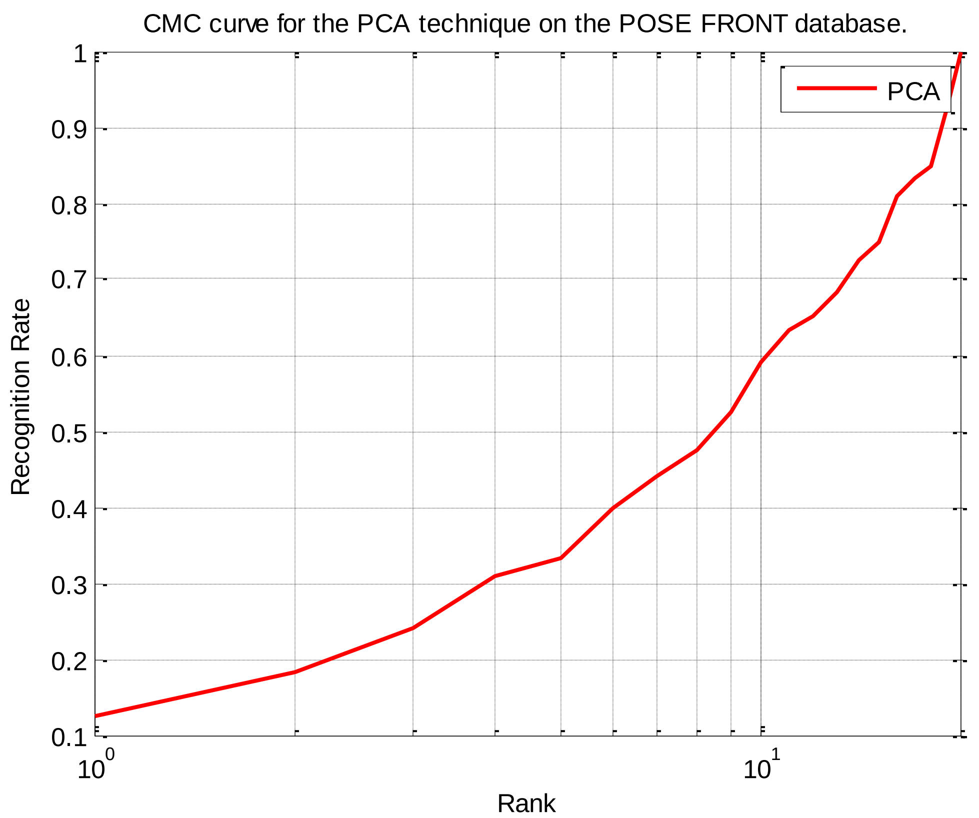

Fig.12. The CMC curve for PCA on POSE –Front

6.2. Illumination

Using PCA on illumination images of only 20 subject. Image no. 1,2 ,3,4,5,6,7 for training and images 8,9,10,11,12,13,14,15 for testing images as shown in fig.5. Here recognition is left side light images to right side light images. All the images are converted in gray scale with size 200 x 150. The rank one recognition rate will be 20 % , with equal error rate equals 20.83% . The ROC curve shown in Fig.13. and CMC curve as shown in Fig.14. The same procedure Using Histogram Equalization technique The rank one recognition rate will be increases to 38.33% , with equal error rate equals 20.90 % . The ROC curve shown in Fig.15. and CMC curve as shown in Fig.16.

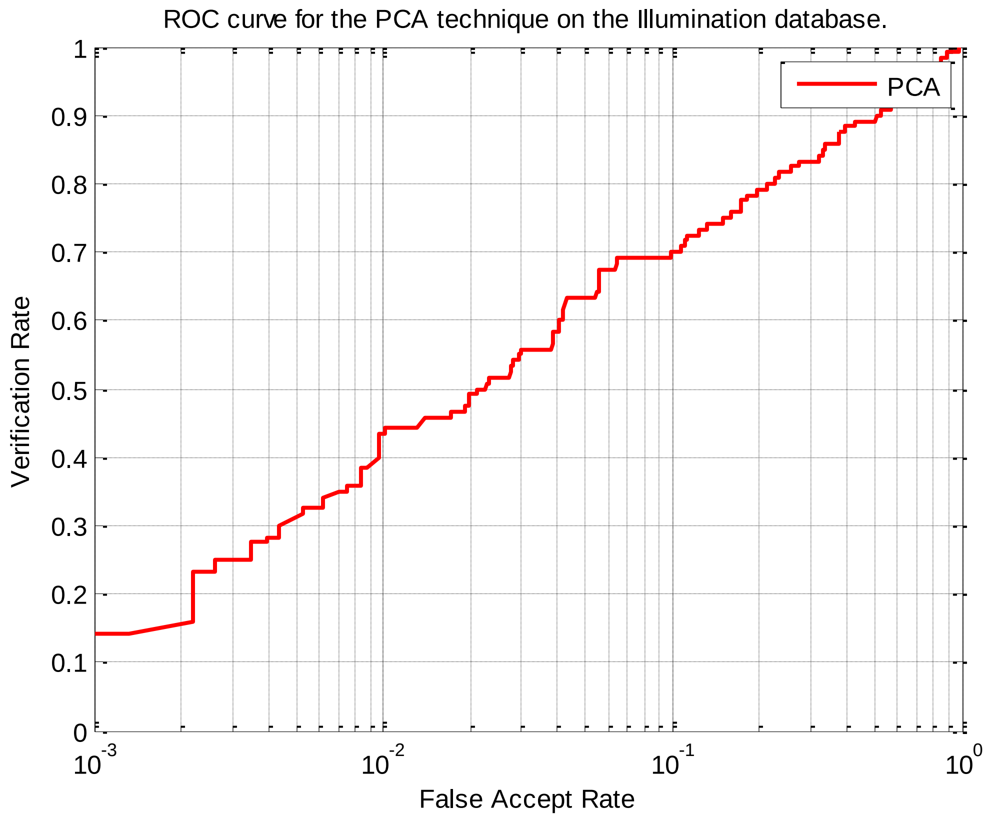

Fig.13. The ROC curve for PCA on Illumination

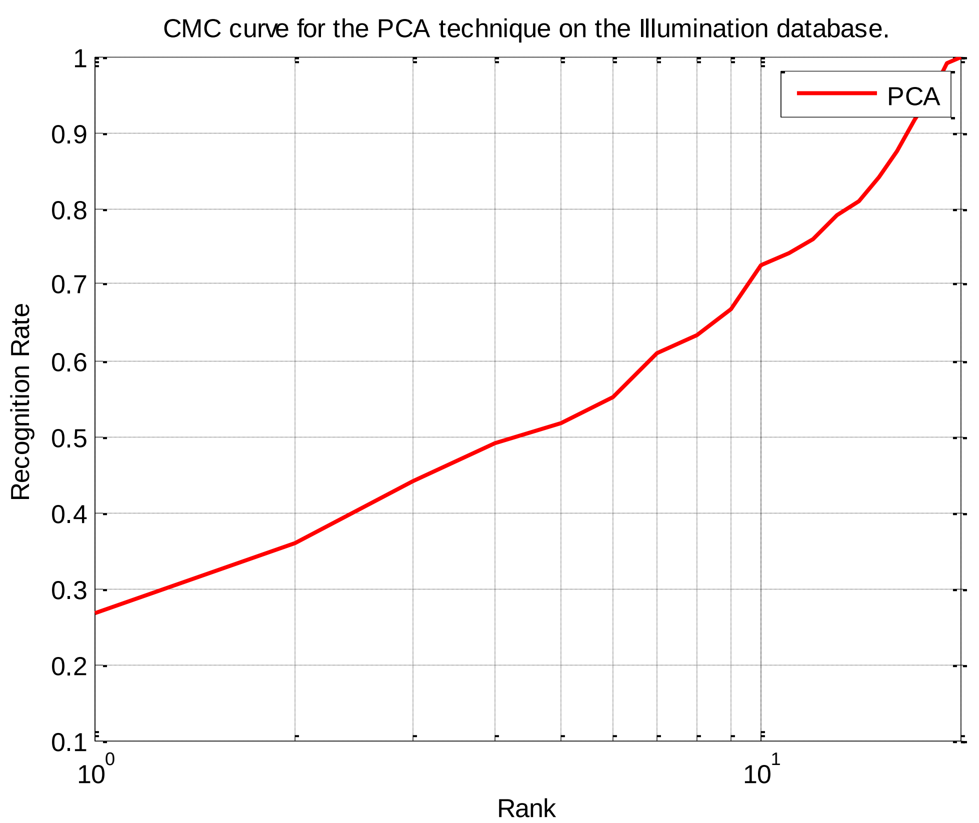

Fig.14. The CMC curve for PCA on Illumination

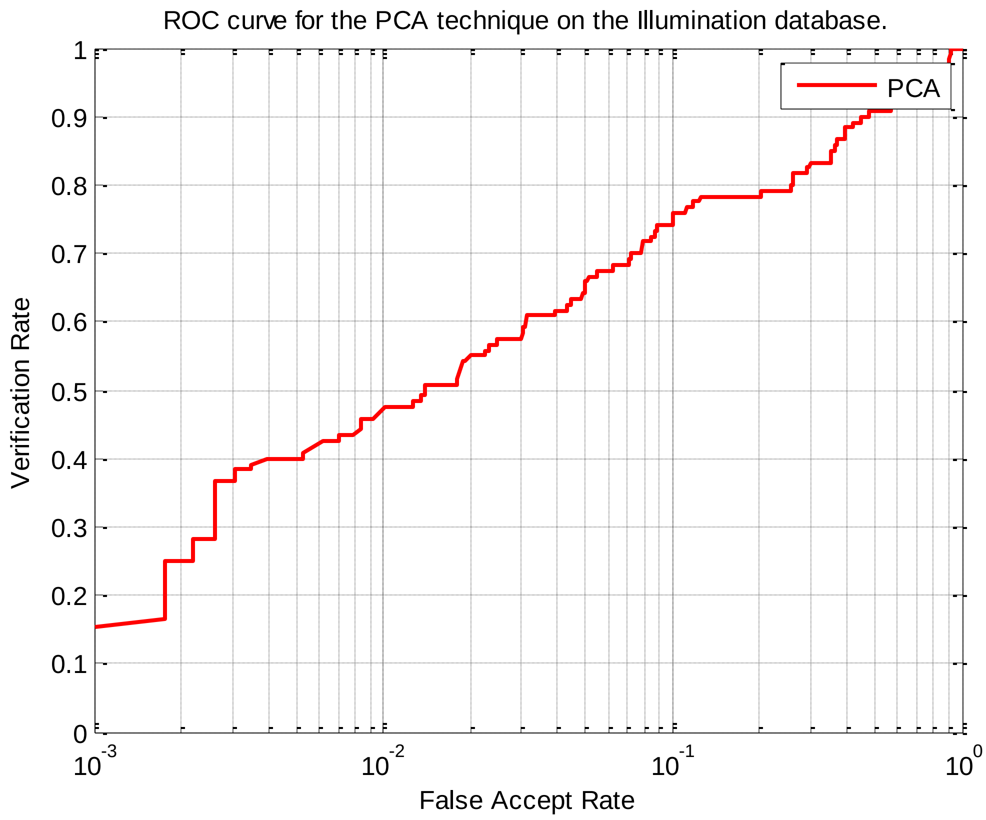

Fig.15. The ROC curve for Histogram Equalization technique + PCA on Illumination

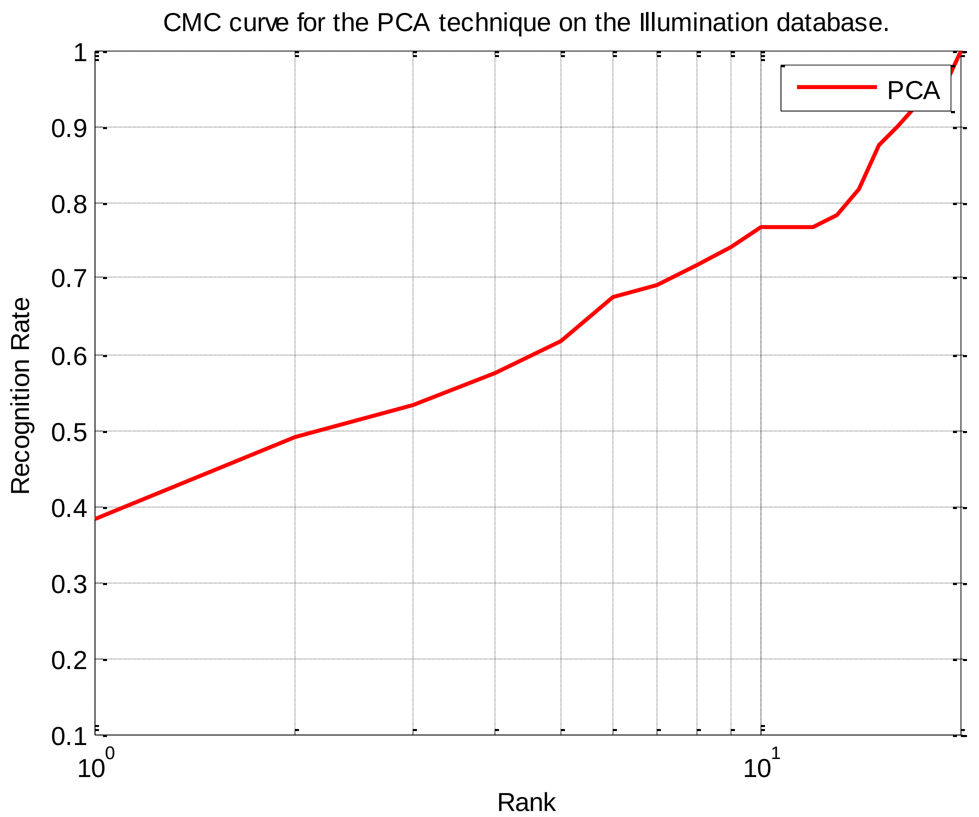

Fig.16. The CMC curve for Histogram Equalization technique + PCA on Illumination

6.3 Facial Expression

Using PCA on Facial Expression images database, selecting only 20 subjects. For illumination images image no. 1,2,3,4,5,6,7 for training and images 8,9,10,11,12,13,14,15 for testing images as shown in fig.6. All the images are converted in gray scale with size 200 x 150. The rank one recognition rate will be

89.17 % , with equal error rate equals 1.27% . The ROC curve shown in Fig.17. and CMC curve as shown in Fig.18.

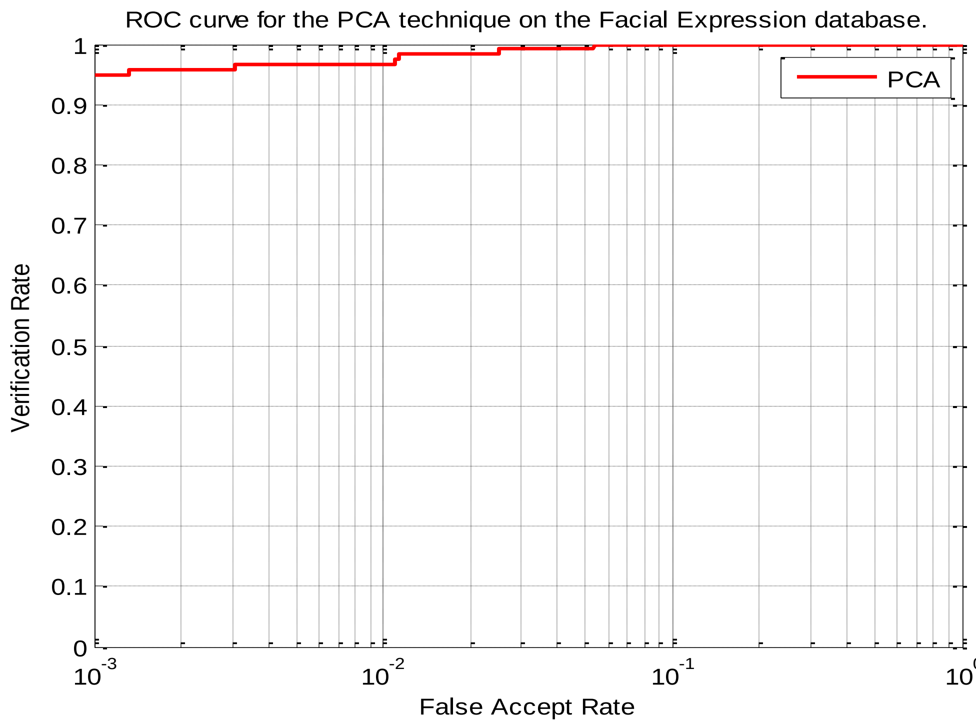

Fig.17. The ROC curve for PCA on Expression

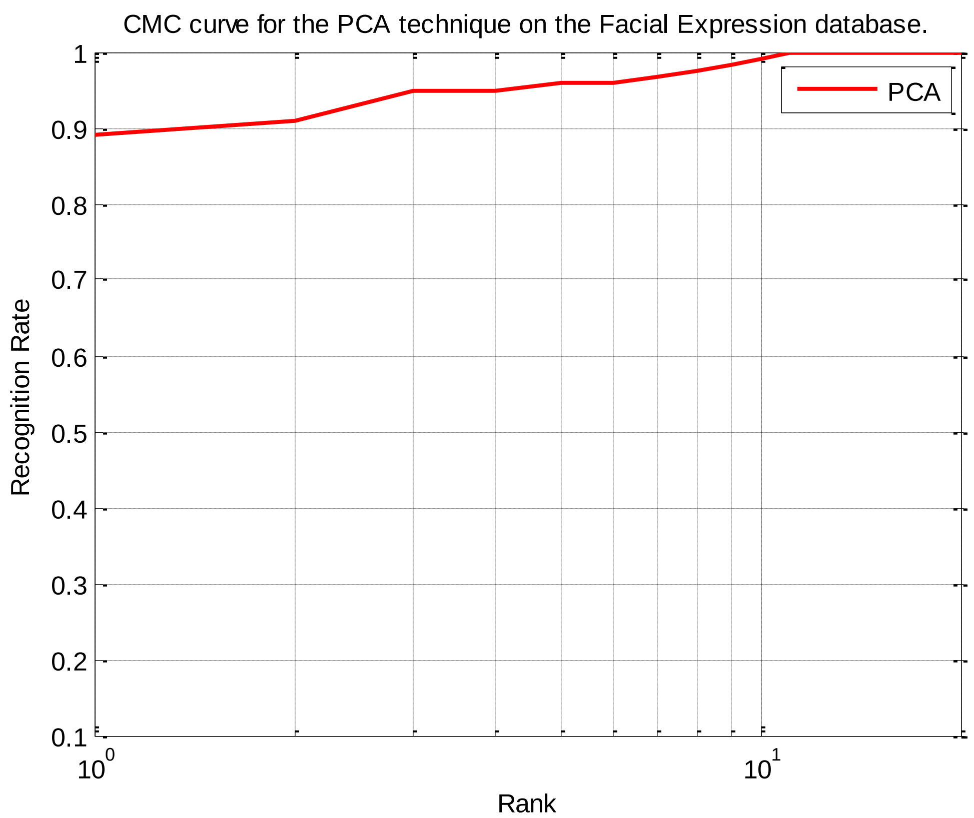

Fig.18. The CMC curve for PCA on Expression

7. CONCLUSION

Using the baseline algorithm PCA . The recognition rates using the pose images with left side pose to right side pose is 12.50 % and illumination with 50% training and testing image combination with original images is 20 % recognition rate . Using histogram equalization for preprocessing the images was 38.33% recognition rate ,whereas same training and testing Combination for Facial Expression recognition is 89.17%.

With this results shows the developed database have capability to give the better results with different algorithms with different combination of part of our database .We use here baseline algorithm PCA for experimental work . Researchers may use this database of different techniques to compare the results with different available databases. Now a days Surveillance images for recognition is hot area in security purpose. This database is helping to the experiment using low resolution images of CCTV cameras with CCTV images or Digital Camera images.

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