A smart technique for attendance system to recognize faces through parallelism

IOP Conf. Series: Materials Science and Engineering **263** (2017) 042095 doi:10.1088/1757-899X/263/4/042095

A smart technique for attendance system to recognize faces through parallelism

B Prabhavathi, V Tanuja, V Madhu Viswanatham and M Rajashekhara Babu
School of Computer Science & Engineering, VIT University, Vellore-632014, Tamil Nadu, India

E-mail: vmadhuviswanatham@vit.ac.in

Abstract: Major part of recognising a person is face .with the help of image processing techniques we can exploit the characteristics apperances of a person. In the old approach method that is used in schools and colleges it is there that the professor calls the student name and then the attendance for the students marked. Here in paper want to deviate from the old approach and go with the new approach by using techniques that are there in image processing. In this paper we presenting spontaneous presence for students in classroom. At first classroom image has been in use and after that image is kept in data record .For the images that are stored in the database we apply system algorithm which includes steps such as, histogram classification, noise removal, face detection and face recognition methods. So by using these steps we detect the faces and then compare it with the database. The attendance gets marked automatically if the system recognizes the faces.

1. Introduction

Maintaining attendance is compulsory and important in all the institutions for knowing the performance of students. This attendance constitutes a major role for students because based on these students get their final grade by the end of their semester for these the students attend their classes without any fail. This is the main factor in improving the education standard. So for these reasons the teacher has to mark the attendance carefully without making any wrong attendance and before completing taking of attendance should make sure whether marked attendance correctly .this is also a time waste process for teachers because of taking attendance manually. But it is very difficult when there is more number of students. So different colleges so follow different methods and some take attendance by using files and some others take attendance by using biometric systems. Other method that is used is by manually signing of students on papers. Whenever they are attending the classes this takes much tie for finding their names on the sheet and there may be chance they may lost the sheet.

Many automatic methods are available and one of them is the biometric attendance. This method is not good because it waste the student's time by standing in the queue to give their thumb impression on the system .This method developed for identifying of the individuals. This method examines the behavioural

features and the physiological of the individuals based on plastic cards, pins and tokens to identify the person. This method includes identification because of the physiological features such as finger prints, face, hand veins, iris and had geometry and features such as keystroke dynamics and the signature are used as the behavioural features. All the institutions follow these attendance systems to keep a record of the students and also to know in which department they are studied. This method is good benefit for the parents because the colleges will send the information student attendance to their parents through mail or system and there is also a chance that the student may delete the mail before their parents can see but with this method they will be having soft copy of image and can be directly sent to the parents personal mail. The first system that is successful is based on the pattern matching applied to the facial features providing a compressed face picture.

Recognition can be classified as two types one is symmetrical and the other is thephotometric .the symmetric method is used for distant features, the other is the photometric which is a Arithmetical method here it filters the image and then shares with the patterns to discard the variances. Face recognition has many advantages compared to that of the biometric methods some of them are in biometric methods there should be some voluntary action involved that is should stand straight in front of the camera or should press their finger on the touch pad to give the biometric whereas in this technique there is no action involved because the camera takes the picture from far away and with the help of these we easily recognise the faces. Image processing also referred to digital image processing and other types of image processing are optical and analog image processing. Many of the image processing method consider the image as the two dimensional and then relate it to the signal processing techniques. The techniques of image processing are emphasized based on the enhancement of the pictorial information for the human interaction and the image storage for the broadcast data storage and machine perception. Face recognition is computer based application capable of recognizing or verifying person from the digital image or from the video. One way to do this is compare the selected image with that of the image from the database. Images are treated for three dimensional and it is considered as the z-axis. Image processing is becoming more popular because of its availability of computers, graphics software large memory size etc. this mainly supports for surveillance and security purposes.

2. Literature survey for face recognition

Many technical methods have been proposed by many.

2.1 Eigen face technique

This process is used for completing reduction in the dimensionality. This algorithm is frequently used for the recognition of faces. This detection and face recognition uses the principal component study. Eigen face acts as a core component for dividing of face into separate feature vector. Covariance matrix used for finding the data from the article vector. The faces are differentiated by using the highest Eigen values. The image having a face is then measured as grouping of Eigen expressions. The difference among faces is then measured using that of the Eigen vectors. Face space is defined as the top M Eigen faces that match with the outline of M dimensional space.

Association and training data has a much relation between them. By the authors [4] to expertly symbolise photographs of the faces. By recreating a image by using collecting small loads for every image and progress image as good face snapshot. Eigen picture [1] helps to obtain the weights of each face. The Eigen face method is widely used because of its implementation and algorithm that makes the face recognition easy. This is good for storage and time of handling is also good. Eigen face has correctness and it depends on many things. The image can be minimized to the dimension size in short period of time can be done by PCA. The result that is satisfactory can be achieved by image pre-processing. The Eigen

face method makes the system work very [2] and we can tell that it is the main advantage .more time is consumed for both Eigen values and the Eigen vectors. This Eigen face is not suitable for location and lightening conditions

2.2 Neural networks patterns

The main goal of neural networks is that it has the capability to perform complex face patterns. The neural networks are employed in many layers, different number nodes, and also different learning for achieving good performance. The applications if this methods are driving of robot autonomously, recognition of objects, and problem recognition. Principal component analysis more efficient than the feature abstraction. Neural network is non-linear so it is used for face recognition. If there are 40 individuals and are having 400 images then the correctness of the face identification is attained by 96.2% by the authors. The time taken for arrangement is 0.5 second and time taken for training is 4 hours and sends slight invariance to rotation translation and scale.in supervised pattern matching because of its ability and plainness we choose MLP algorithm that is multi-layer perceptron. For pattern classification neural networks are used [5]. For extracting of feature vectors and also for finding specific feature points Gabor wavelet method is used. By experimenting this we got better results compared with other algorithms like Eigen approaches and matching of patterns. [6]A new technique that polynomial neural network is proposed for face recognition. This principal component analysis method used from extracting the features and dimensionality of the image designs [7]. When there is a non-linear vector SRDKA can give precise solutions than that of the subspace [8].when there is pushing of inhibitory neurons a new method convolutionary network s proposed. SRDKA is used for solving the computation of Eigen vector computation and regression difficulties by saving of enormous costs [9]. By using of single system authors more finding rate and less false optimistic rate with that of the composite training.

2.3 Fisher face approach

Fisher faces the most widely and effectively used methods for recognition of faces. This method depends on the method of appearance. Linear or fisher discriminant analysis for face recognition established in the year 1930 by Fisher. It one of successful methods that are used for face recognition procedure Belhumer et al. authenticated the method called LDA. This LDA method used for the finding of set of centre images that maximizes the ratio of the outside the class scatter and within the class scatter. This method has some drawbacks that the session the distribute medium will be perpetually alone ever since pixels of number image more than that pictures that are maximized for detection error rate so that if any alteration is posed and brightness if there changes that is inside the pictures that are same. Many algorithms have been proposed to overcome the above drawbacks. Belhumeur et al. [12] have designated fisher face method for face recognition by practising the linear discriminant analysis and principal component analysis that lead to the subspace projection matrix same as that of the Eigen face method. This fisher face method has the advantages of by taking exclusive course data and by falling dissimilarity surrounded by course and then exploit the class separation. In this fisher face method N * M images are composed and then reformed into N *M)*1 vector.one can set to categorize the training data compact changed persons and their different pictures .The main disadvantage of thismethod further testing conclude prediction image planetary compared to that the Eigen face and also it takes a lot of time for calculating the ratio between the outside

class scatter to inside class scatter. The dimension of projection of the face space is not that much compared to Eigen face that results in more handling time for recognition and then large storage for face.

2.4 Elastic bunch graphing approach

This conventional of the features with the help data structure method entirely different to that of the both fisher face and then the Eigen method. This face recognition method uses the elastic bunch matching method that deals with that of the identifying the faces considering athat is called as the bunch graph[13] and also it same for query image and also for the landmarks that are expected and they are followed by using that of the bunch graph. By taking the instances of Gabor filters which has other name called the face graph the features are taken out. The fraction that is used for control sebum is done on the source of similarities between the query image and the face images of the database.

EBGM that is elastic of bunch graph matching makes uses structure material of face method and then reproduces that of images of the same subject such as scale, rotate, and then deform in the plane of the image. During the matching process one model is taken and then deform, rotate, scale and translated. Labelled graph boundaries are used in this and distant data and nodes are labelled by using constant wavelet jets. To yield the local features the images Gabor wavelet conversion is used. These are inspired difficulty kernels that are controlled by the Gaussian enclose function that contains the set convolution constants for different kernel's advices occurrences. Elastic graph matching the simple process for new graphs and also associate to graphs with the images.

In this version a single labelled graph directed into an image. The graph that labelled has set organised jets in particular spatial order. By making using Gabor wavelet relative set of jets can be designated to transform of the image. The image jets the same relative spatial arrangement to that the graph jets and each image jet related one graph jet. For likeliness of growth allows for some translation, distortion and rotation up some of the extent. The typical correspondence stuck both the picture the diagram the similarity of the graph with that of the image. One difference compared Eigen faces method that it treats one vector per feature of faces. Because of this even when it modified or missing one feature we can identify the person. The data that deposited can be added to database for storage. This makes easy when new image is added and no energy need because already it kept the database. It finds a person up to 23 points. The weakness in method is blatant to relieving surroundings for this it needs diagrams has substantially image. Consequence have substantial reduction in the identification rate when the variations in illumination are larger.

2.5 Template matching approach

Template matching method is used for describing the face patterns of the single face. Bruneli and Poggio obtained four features that is nose, mouth, eyes, and face for template matching. The results are compared with the algorithm that is geometrical centred on 188 images of the 47 subjects by the system. The algorithm that is design matching is very good and its chives 100% face recognition. For linear arrangement patterns it uses the PCA method that is principal component analysis method by using Eigen faces. When there is extraction of patterns then their-arises the difficulty. Advantage of this method is it easy to implement and also less costly compared to other classifiers. Template based methods gives good results compared to that of the feature based methods. The pattern algorithms are very costly and also they

cannot be handled. The pattern that is given and the input image can be easily fingered by using recognition procedure. Karungaru et al practised that genetic algorithm with different outcomes on the target image by using template as pre-processing. The functioning of these method is said that additional features are needed for this for the face recognition problems. [14]The pattern matching of a test image is signified by two dimensional array of strength values with appropriate method of Euclidean distance such as single pattern on behalf of that of the whole face. Some additional efforts are needed for increasing the performance of the face recognition approaches when they come across the surroundings of real world [15] [16]. The method that is currently used is not free from the boundaries. Template matching method is a reasonable approach

2.6 Geographical feature matching

The working out fixed of image expressions as of image of a surface depends on geometrical matching. Automatic facial acknowledgement and other works that are important are done by that of the geometrical of feature matching since 1973.the chief facial features such as mouth, nose eyebrows and eyes and outline of a face is defined by the vector that is used for representing of the location and size of the facial .the recognition was done by using Bayes classifier. The system attained a recognition rate of 75% on the database of a 20 people by making use of two pictures those are model image and the other is the test image. The geometry expressions are taken from picture mouth position is taken out a set for by authors [15]. These people has taken 35 features and formed a 35 dimensional vector. By doings so they achieved a 90% acknowledgment percentage databank certain persons. The author authors of [17] offered assortment detachment process that accomplished acknowledgment level of 95% interrogation data store 687 personalities.30 manually signified distances was signified by every face. [17-18] the other authors reprocessed the methods to find the features themes every image that leads to decreased packing inevitability data store. Accurately there will be 35 to 45 feature points for every face that is produced. In this method two cost are evaluated they are similarity cost and topological cot were evaluated the geometrical feature identification depends mostly on the exactly measured distances between the features that are useful for finding out matches from the database. This method depends on the exactness of the feature location algorithms. The main drawback of this method is that the automated feature position algorithms do not offer a required substantial computational time and a high degree of correctness. This procedure mainly includes the improvement of the facial images with chin and ears and also include the potential features because it enhances the method that are used for face recognition process. The capability to identify the face model is planned by dividing it into four steps .the first step that is used is the pre-processing step. Here in this step it decreases the sound then effort picture transmuted to that of double. The next method is used for grouping the spitting image geographies it discovers basis of the labelled structures. Finally the probable distance used for identifying process is calculated.to decrees the examine planetary trough diminishing imagines sorts data has been presented by the Khalid et al author. This process achieves a recognition rate of 86%.In Haiku and Sadka the calculation of face image is formed by the distribution of distance. The image that are formed by the distribution of distance defines the shape Gabor sieves that involves mass then and degree. The concerns to partial image is taken for differentiating among the illustrations at data list is presented by the Gabor filter. Zhental and other authors proposed a acknowledgement process that is assembled the image graphics. Here mainly image

separate to various face images are then face alignment reformed measure and image space. The next step is the LBP and it presents a virtuous surface demonstration defining makeover related data for changed spaces that provides good -arranged image acknowledgement structures. Geometry that depends on the face recognition technique that makes use of the makes use of the subspace that are related to that of the models.This provide the geometrical asserts image space that provide active acknowledgement server some expanse tenders that are related to images.

3. Applications

3.1 computer human interaction

Proactive computing, audio visual gaming, computer based reality training programs.

3.2 face ID smart cards

National ID, voter's registration user authentication, passports, drivers-licence.

3.3. Safety and secure

Device logon, intranet and internet safe keeping interchange systems, application safety, medicals archives, database security, and extremist attentive folder encrypt. TV parental control.

3.4 audio-visual observation

Shoplifter, marker incident predictor investigation and unsure pursuing, crime stopping uncertain alert, suspect circumstantial patterned.

3.5 Others applications

The applications of face recognition are used frequently and is estimated to develop broadly and keep growing the lesser the enormous presentations such as presence monitoring.

4. Ensemble method

The picture that in use camera is enriched by by means of steps such as sound advisory and histogram equalization

The image is then [19] acknowledged from picture then the structures that took by this in the second step. The features that are taken out deposited in the face archive with different number for different persons.

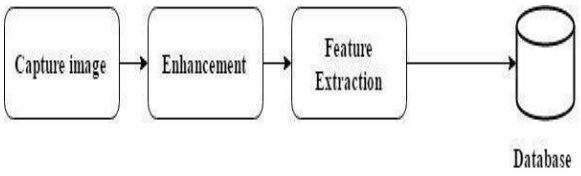

Fig1. Collective process

5. Proposed system

In our procedure comprises camera is used catching of the pictures of lecture hall image then directing pictures to picture enlargement segment. Spitting image rises identification and appreciation of the modules after theimage improvement and being present noticeable at particular time to the recorder system. The experimental setup figure2 depicted. Patterns of face pictures of an single student is stored in the databank at time ofregistration.so the faces are then recognised from that of the image then the procedure matches with the database. The attendance marked on server if any of the face identified from the database and it can be accessed by everyone for numerous reasons. This also habits the procedure that can be used for attendance. The system is also attached with the time table unit that robotically gets class at what time and what subject. The system robotically becomes presence deprived of opinions the learners and the teachers. So teachers after coming to the class when taking attendance they just press the attendance button to start the attendance procedure. This method is highly protected method here no one can give the attendance of the other and also saves a lot of time.

The presence deposited system that all right to use administrations or blood relation the learners can use for them only. The device is used to take picture that is attached to that of the system takes the pictures endlessly to identify and also to find the students those who are sitting in the classroom .For avoidance of false recognition of images skin classification method is used.[20]This skin classification method progresses the proficiency and the correctness that acknowledgement procedure. Mainly it is considered all other images recaps the other images then kept as black in skin classification method, it expressively improves truthfulness face tracking procedure . In the experimental arrangement show in figure1 two databases are shown. Assembling of face images and the images that are mined geographies at period procedure of registration is done by using of the face database .The data around instructors and learners take presence the second attendance of database is used.

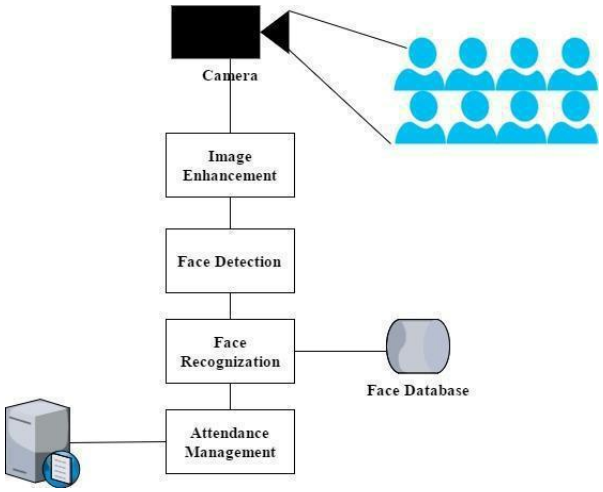

Figure 2 Experimentation setup

5.1 Algorithm flowchart

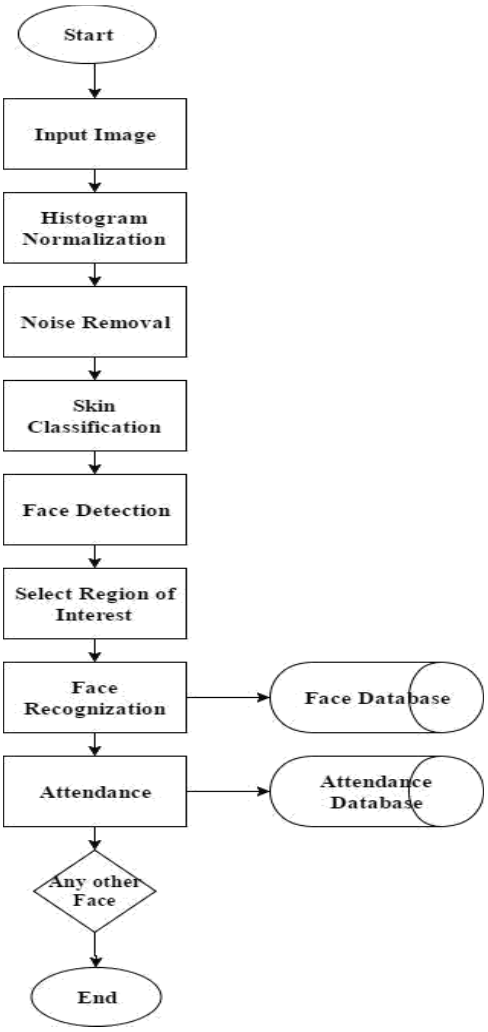

Figure 3 represents the flowchart algorithm

5.2 Software system procedure

The algorithm that has been taken for is subdivided from system process. Subsequent stages are comprised from the system algorithm.

1) Image Acquisition
2) Histogram Normalisation
3) Noise filtering
4) Classification of skin
5) Face tracking
6) Face identification and
7) Monitoring attendance

In the first step the image is taken from the camera and as image is taken with help of camera there will be lighting effects that in image that is captured .Because of this there will be dissimilar lighting condition and there will also be some noise that has disconnected from further phases. For elimination of noise medium filter taken and unlikeness enlargement three-dimensional area histogram normalization has been taken. Here in this next is explanation of that of the every phase algorithms that are directly above pictures after every process.

5.2.1 Image procurement

Image Procurement is also called as image acquisition.

The picture is settled that of the pixels that are collected.

Figure4: appearance input

5.2.2 Scatter image normalisation

The spitting image that is taken rarely consume brilliance else dimness that is used for decent results. The key is the RGB one .The picture then renovated grey picture the progress.

Figure 5. class image in grey

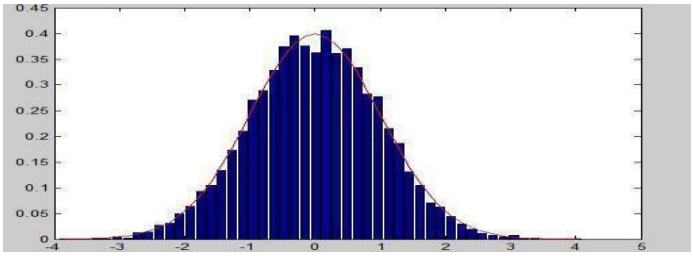

Figure 6. image input for Histogram

For dissimilarity enhancement in spatial domain histogram normalization is a good method. This helps to identify the learners meeting on rear rows are obviously realized now.

Figure 7. equalized image of histogram

From this straightforwardly perceived the people meeting on rear rows are evidently met. So we can without difficulty recognised. [22]At hand also other procedures that are used creating of picture illumination system in a different way .

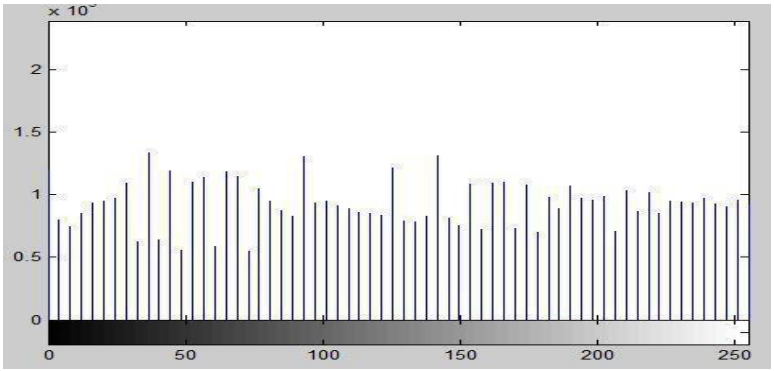

Figure 8
This represents the histogram for equilzed image

5.2.3 Noise clarifying method:

There may exist a lot of causes of sound in the participation image when we take picture with the camera. Many methods available there is one method that is low permit clarifying in the frequency area it might be a virtuous choice but this also leads to the elimination of some significant information in image. Medium cleaning is used in our system for the reason for sound dismissal in form of normalised spitting image.

Figure 9 Noise filtering

5.2.4.Overview of skin classification

This method is to improve the adeptness of face identification procedure. It is castoff to rise effectiveness of the face identification procedure. The scanning of the process of faces, viola and jonnes procedure is recycled for discovering and exactness is developed if membrane categorized [22]. First pixel is systematically interconnected skin and transfigures white and remaining black. The thresholding of skin colours is done by the second image.

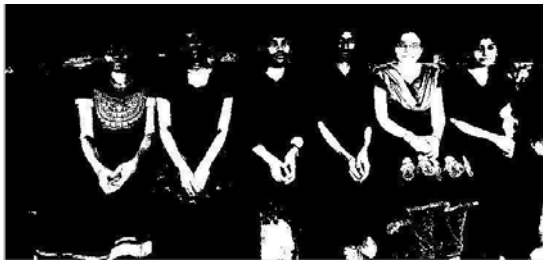

Figure 10. Classification of skin **5.2.5** Detection of face

Face detection method notices the segment faces by shaping spheres on image having pictures of learners. Haar classifiers are used for the recognition of the faces. After performing the classification of skin the degree of algorithm has been enriched. This face detection algorithm are first used for changeability of images with different action and then it used for illumination conditions and this also applied for detecting the expressions on face in existent phase audio-visual. First this procedure used for pictures and functioned for classroom of image for finding of multiple faces in the image. Next step after discovery from images the faces are collected for identifying faces. This procedure winding is recycled to rise the speed of the algorithm. The image that is collected is then allotted to distinct drift because of purpose of knowledge reasons.

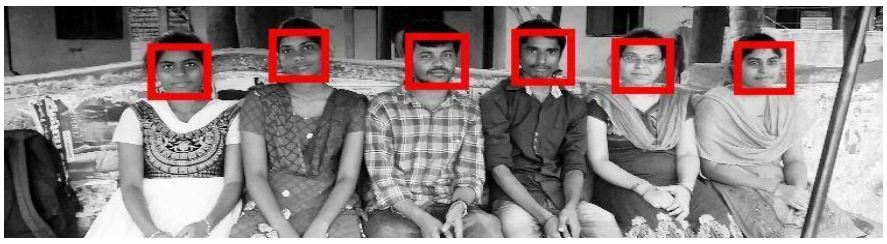

Figure 11.
This image depicts the face detection

5.2.6.Attendance and face recognition

Next stage that used after the image recognition method is face identification method. It can be accomplished by collecting the image that is first identified face from image then is matched with images that are in the database. In this manner the images the learners are verified one after another with record

that is having faces by using [23] Eigen image technique the being present noticeable on the system. This approach termed as collection of region attention.

6. Conclusion

Here paper we present method which can change the ancient physical methods by using the correct and efficient method for taking attendance in classroom atmosphere. The techniques are trustworthy, attainable and safe enough for use. This method doesn't need any definite hardware relating the classification in lecture hall can be done by means of a camera and a mainframe. We practise some algorithms as a necessity so which are able to detect the images and also to rise the outcomes of system.

References

[1] TolbaA S, El-BazA H and El-HarbyA 2006 Face Recognition: A Literature Review *International Journal of Signal Processing*
[2] SushmaJaiswal, Sarita Singh Bhadauria and Rakesh Singh Jadon 2011 comparison between face recognition algorithm Eigen faces fisher faces and elastic bunch graph matching *Journal of Global Research in Computer Science* **2**
[3] Ming-Hsuan Yang, David JKriegman and NarendraAhuja2002 Detecting Faces in Images: A Survey *IEEE transactions on pattern analysis and machine intelligence*
[4] Kirby M and L.Sirovich 1990Application of the Karhunen-Loeve procedure for the characterization of human faces *IEEE Transaction Patt. Anal. Mach. Intell*
[5] Li X and Areibi S 2004 A Hardware or Software code sign approach for Face Recognition*The 16th International Conference on Micro-electronics Tunisia*
[6] Yue Ming, QiuqiRuan, Xiaoli Li and Meiru Mu 2010 Efficient Kernel Discriminate Spectral Regression for 3D Face Recognition *Proceedings Of ICSP*
[7] MohammedJaved and Bhaskar Gupta 2013 Performance Comparison of Various Face Detection Techniques *International Journal of Scientific Research Engineering & Technology (IJSRET)***2**
[8] Fisher R A 1936 The Use of Multiple Measurements in Taxonomic Problems
[9] Belhumeur V, Hespanda J and Kiregeman D 1997 Eigen faces vs. fisherfaces recognition using class specific linear projection *IEEE Trans. on PAMI* 711-720
[10] HongDuan, Rusher Yan and Kunhui Lin 2008 Research on Face Recognition Based on PCA*IEEE*
[11] LaurenzWiskott, Jean-Marc Fellous, Norbert Krüger, and Christoph von der Malsburg 1997 Face Recognition by Elastic Bunch Graph Matching *IEEE Transactions on pattern analysis and machine Intelligence pulished* **19** 775-779
[12] K.Subban ,R. Krishnaveni ,K. Fred , L.Selvakumar and R.K.Nallaperumal 1993 Human face detection in colour images using skin colour and template matching models for multimedia on the Web
[13] Wireless and Optical Communications Networks IFIP *International Conference Analysis and*
[14] Baron R J published pape in 1981 on Mechanism of human facial recognition" Int'l J.Man Machine Studies **15** 137-178
[15] CoxI J, GhosnJ and YianiosP N 1996 Feature-Based face recognition using mixture-distance *Computer Vision and Pattern Recognition*
[16] ManjunathB S, ChellappaR and C vonder Malsburg published in 1992 "A Feature based approach to face recognition*Proc". IEEE CS Conf. Computer Vision and Pattern Recognition* 373-378

[17] Schneiderman H and KanadeT 1998 Probabilistic Modelling of Local Appearance and Spatial Relationships for Object Recognition in: *Proc. IEEE Conf. Computer Vision and Pattern Recognition* 45-51

[18] LijuanDuan, Guoqin Cui, Wen Gao and HongmingZhang 2002 Adult Image Detection Method Base-on Skin Colour Model and Support Vector Machine *ACCV2002:The 5th Asian Conference on Computer Vision*

[19] Taiping Zhang, Yuan Yan Tang, Bin Fang, ZhaoweiShang, Xiaoyu L M Turk and PentlandA1991 Face recognition using Eigen faces *Proc. IEEE Conference on Computer Vision and Pattern Recognition*

[20] LiY, Gong S and LiddellH 2000 Support vector regression and classification based multi-view face detection and recognition *IEEE International Conference on Automatic Face and Gesture Recognition*

[21] Li S Z and ZhangZ Q 2004 Float Boost Learning and Statistical Face Detection *IEEE Transactions on pattern*