**Abstract**

This paper presents an automated system for human face recognition in a real time background for an organization to mark the attendance of their employees. The face recognition have played an important role in surveillance system. So Smart Attendance using Real Time Face Recognition and detection is a real world solution which comes with day to day activities of handling employees. The actual advantages of face based identification over other biometrics are uniqueness and acceptance. The task is very difficult to the real time background subtraction in an image is still a challenge. To detect real time human face, principal component Analysis(PCA) is used to recognize the faces detected with a high accuracy rate . The matched face is then used to mark attendance of the employees once recognition is done, automatically attendance will be updated in an Excel Sheet along with his name , date and time. The goal of this paper is to evaluate various face detection andrecognition methods, provide complete solution for image based face detection and recognition with higher accuracy, better response rate as an initial step for video surveillance.

Keywords: Face Detection, Face Recognition, Biometrics, Face identification.

**Introduction**

Face feature extraction is developed for many applications such as biometrics, Face recognition systems and Human computer interface etc. Therefore reliable face detection is required for the success of these applications. The task of human facial feature extraction is not easy. Human face varies from person to person. The race, age and other physical characteristics of an individual have to be considered thereby creating a challenge in computer vision. Facial feature detection aims to detect and extract specific features such as eyes, mouth and nose. It takes input image through a web camera continuously. The main camera and attendance identification display can be placed at the entrance of the organization to get best result. It is a way of identifying different conditions of attendance marketing. The camera should be installed in a place with good light in the background and free of obstacles. Attendance is automatically calculated depends on presence of employees. An android application is implemented for finding the monthly salary details and no of working days details.The goal is to implement the system model for a particular face and distinguish from a large number of stored faces with some real-time variations as well. It gives us efficient way to find the lower dimensional space. Further this algorithm can be extended to recognize the gender of a person or to interpret the facial expression of a person.

**Related Works**

Face recognition has been a very popular research topic. The first attempts began in the 1960's and semi-automated system. It used to eyes, ears, noses, and mouths. Then distances

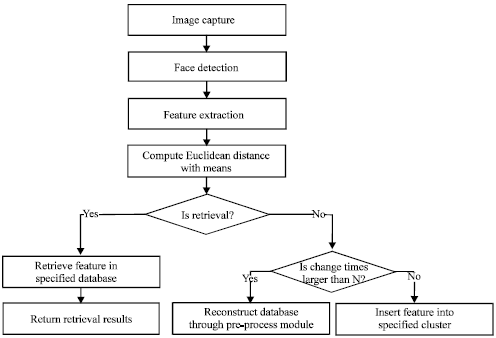
and ratios were computed from these marks to a common reference point and compared to reference data. In the early year1970's Harmon created a system of 21 subjective markers such as hair colour and lip thickness.

Face description approximating the eigenvectors of the face image and correlation matrix these eigenvectors are known as Eigenfaces system model isnot a practical success. Because of the need for precise alignment and normalization .Turk and Pentland demonstrated that when we perform the coding using the eigenfaces the residual error could be used both to detect faces in cluttered natural imagery to determine the precise location and scale of faces in an image.

Face recognition has become a popular area of research in computer vision and one of the most successful applications of image analysis .Because of the problem not only computer science researchers are interested in it, but psychologists also. It is the general opinion that advances in computer vision research will provide useful to neuroscientists and psychologists into how human brain works.

This paper brings together new algorithms and insights to construct a framework for robust and extremely rapid object detection. This framework is demonstrated on, and in part motivated by, the task of face detection. Toward this end we have constructed a frontal face detection system which achieves detection and false positive rates which are equivalent to the best published results [14], [11], [13], [10], [1]. This face detection system is most clearly distinguished from previous approaches in its ability to detect faces extremely rapidly. Operating on 384 by 288 pixel images, faces are detected at 15 frames per second on a conventional 700 MHz Intel Pentium III. In other face detection systems, auxiliary information, such as image differences in video sequences, or pixel color in color images, have been used to achieve high frame rates. Our system achieves high frame rates working only with the information present in a single grey scale image. These alternative sources of information can also be integrated with our system to achieve even higher frame rates. Multiple face tracking has been a growing research interest in recent years. Face detection, recognition, tracking, gesture recognition, and 3D modeling are some examples of the related applications. The first step of almost all face processing methods is face detection. In this paper, we have proposed a real-time and accurate method to detect and track multiple faces in video frames. This method uses face detection, tracking, and occlusion handling subsequent processes. In the proposed method, we have utilized new approaches for skin detection, face detection, and tracking. One of the main advantages of the proposed method is its robustness against usual challenges in face tracking such as scaling, rotation, scene changes, fast movements, and partial occlusions.

**Diagram**



**A. Feature base approach**

In feature based approach the local features like nose, eyes are segmented and it can be used as input data in face detection to easier the task of face recognition.

**B. Holistic approach**

In holistic approach the whole face taken as the input in the face detection system to perform face recognition.

**C. Hybrid approach**

Hybrid approach is combination of feature based and holistic approach. In this approach both local and whole face is used as the input to face detection system

**Litelature Survey**

**Face identification**

It’s a one to many matching process that compares a query face image against all the template images in a face database to determine the identity of the query face. The identification of the test image is done by locating the image in the database that has the highest similarity with the test image. The identification process is a closed test, which means the sensor takes an observation of an individual that is known to be in the database. The test subject’s (normalized) features are compared to the other features in the system’s database and a similarity score is found for each comparison. These similarities scores are then numerically ranked in a descending order. The percentage of times that the highest similarity score is the correct match for all individuals is referred to as the “top match score”.

**Introduction of AFR**

Face recognition is a task humans perform remarkably easily and successfully. But the automatic face recognition seems to be a problem that is still far from solved. In spite of more than 30 years of extensive research, large 13 number of papers published in journals and conferences dedicated to this area, we still cannot claim that artificial systems can measure to human performance. The automatic face recognition has been started science 1960. First automatic face recognition system was developed by Kanade. The performance of face recognition systems has improved significantly but still the problem is not accurately solved. Today’s security issues make computer vision and pattern recognition researcher more concern on this facial recognition topic. The motivation to build of face recognition system is to use its advantage in daily life using low cost desktop and embedded computing systems.

Among the bioinformatics technologies face recognition has some additional advantages: it’s Easy to use, Natural and Nonintrusive. This tends researcher to do further work. Facial features scored the highest compatibility in a Machine Readable Travel Documents (MRTD) system.

**System overview**

The ultimate goal of face Recognition system is image understanding the ability not only to recover image structure but also to know what it represents. given still or video images of a scene, identify or verify one or more persons in the scene using a stored database of faces. The solution to the problem involves segmentation of faces (face detection) from cluttered scenes, feature extraction from the face regions, recognition or verification. Foridentification, the input is an unknown face, and the system reports back the determined identity from a database of known individuals, whereas in verification problems, the system needs to confirm or reject the claimed identity of the input. A face recognition system can identify faces present in images and videos automatically .It can operate in either or both of two modes: (1) Face verification( authentication).(2) face identification (recognition).

**Face verification**

Involves a *one to one match* that compares a queryface image against a template (model) face image whose identity is beingclaimed.

**Face identification**

Involves a *one to many match* that compares a queryface image against all the template (model) images in the database to determinethe identity of the query face.

**Face Recognition Processing**

A face recognition system can split into *four* modules. Face is a three dimensional object and face recognition is a visual pattern recognition problem. For facial recognition purpose the following types of data can be used:

• 2DImages.

• 3Dimages

**Processing steps before face recognition**

1. Detection (Normalization): segment the face from the background.

2. Alignment (Localization): more accurate localization of the face and scale of each detected face. The input face image is normalized Concerning geometrical properties, such as size and pose, (geometrical transforms or morphing) and Concerningphotometrical properties such illumination and gray scale.

**Analysis in Face Subspaces**

Face recognition results depend highly on features that are extracted .The original image representation is highly redundant, and the dimensionality of this representation could be greatly reduced when only the face patterns are of interest. The face image is effectively represented as a feature vector. We can getEigenfaces by:

• Principal Component Analysis (PCA).

• KarhunenLoeve transforms (KLT).

Face detection can be considered as a task of distinguishing between the face and non face manifolds in the image space and face recognition between those of individuals in the face manifold. We detect face and non face manifold and within the detected PCA space we can distinguish individual faces.

**Technical Challenges**

The performance of many modern face recognition methods deteriorates with changes in lighting, pose, and other factors. The key technical challenges are:

**Large Variability in Facial Appearance:** The variations between the images of the same face due to illumination and viewing direction are almost always larger than the image variation due to change in face identity”. This variability makes it difficult to extract the basic information of the face objects from their respective images. Various imaging parameters, such as aperture, exposure time, lens aberrations, and sensor spectral response also increase variations.

**Highly Complex Nonlinear Manifolds:** Challenges in face recognition from subspace viewpoint. Principal Component Analysis (PCA), Independent component analysis (ICA), linear discriminant analysis (LDA) techniques are unable to preserve the 16 non convex variations of face manifolds necessary to differentiate among individuals Euclidean distance and Mahalanobis distance, which are normally used for template matching, do not perform well for Classifying between face and non face manifolds and between manifolds of individuals is a challenge this crucial fact limits the power of the linear methods to achieve highly accurate face detection and recognition.

**High Dimensionality and Small Sample Size:** The learned manifold or classifier is unable to characterize unseen images of the same individual faces.

**Technical Solutions**

To construct a “good” feature space where face manifolds become simpler, a successful algorithm usually needed which combines both of the following strategies Normalize face images geometrically and photometrically, such as using morphing and histogram equalization. Extract features in the normalized images which are stable with respect to such variations, such as based on Gabor wavelets.

**Geometric feature based approach**

This technique can detect facialfeatures such as eyes, nose, mouth, and chin. Properties of and relations (areas,distances, angles) between the features are used as descriptors for facerecognition.

**Statistical learning approach**

Learns from training data to extract good features and construct classification engines. During the learning, both prior knowledge about face and variations seen in the training data are taken into consideration

**Appearance based approach**

Approach generally operates directly onan image basedrepresentation (array of pixel intensities). such as PCA and LDAbased methods,Above techniques are not accurate enough to describe subtleties oforiginal manifolds in the original image space. This is due to their limitations inhandling nonlinearity in face recognition.

Approach to handle the nonlinearity:

• Kernel techniques (kernel PCA and kernel LDA).

• Local features analysis (LFA).

• Gabor waveletbased features.

• Local binary pattern (LBP).

**Proposed System**

The Proposed System is a real time System. It takesinput image through a web camera. The main camera and attendance identification display can be placed at the entrance of the organization to get better result. It is a way of identifying different conditions of attendance marking.

The camera should be installed in a place with good light in the background and free of obstacles. Attendance is automatically calculated depends on presence of employees.

When the new image of a person differs from the images of that person stored in the database, the system will be able to recognize the new face and identify who the person is. The proposed system is better mainly due to the use of facial features rather than the entire face.

Recognition accuracy and better discriminatory power Computational cost because smaller images (main features) require less processing to train the PCA. Because of the use of dominant features and hence can be used as an effective means of authentication

Android applications is implemented for finding the monthly salary details and no of working day details.

**Conclusion**

It can be concluded by the some discussion that a reliable, secure, fast and an efficient system has been developed replacing a manual and unreliable system. This system can be implemented for better results regarding the management of attendance and leaves. This system will save time, reduce the amount of work the administration has to do and will replace the stationary material with electronic apparatus. Hence a system with expected results has been developed but there is still some room for improvement. So the future development of face recognition, it should be capable of detecting any faces under any light conditions.

**Future Scope**

This document is the only one that describes the requirements of the system.It is meant for the use by the developers, and will also bythe basis for validating the final delivered system. Any changes made to the requirements in the future will have to go through a formal change approval process. The developer is responsible for asking for calculations, where necessary, and will not make any alterations without the permission of the client.

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