Authenticated Attendance Using Face Recognition

M.Mohamed Imdhadullah [1], S.Alex Pandian [2], A.Shanmugapriya[3]
[1, 2, 3] Department of Computer Science and Engineering
[1, 2, 3] Sri Ramakrishna Engineering College, Coimbatore - 641 022, INDIA

Abstract-*This project is about monitoring the attendance for industrial employees through face recognition. Our system takes the attendance automatically using face recognition instead of using ID card detection or Thumb impression. The accuracy in recognition of a person is the ultimate aim of this face recognition system and this identification is used for further processing. We are using a method for estimating the attendance precisely using all the results of face recognition obtained by continuous observation. Continuous observation increases the performance and efficiency for the estimation of the attendance. This image processing technique is used to remove the haze in the image with the help of haze removal algorithm.*

Keywords-Face recognition system, Principal components analyses (PCA), Artificial neural network (ANN), Eigenfaces.

I. INTRODUCTION

Over the last few decade lots of work is been done in face detection and recognition to identify a person because it doesn't require human cooperation.

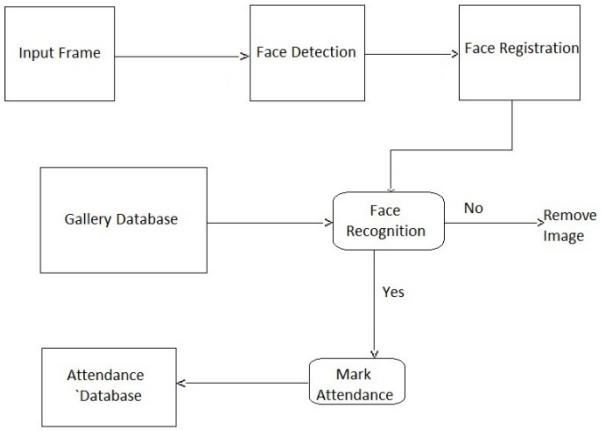
The Face Recognition has security systems and searching of persons etc. Moreover the database can be easily designed by using any image of the person. Reading or learning the face of a person done by the human brain using neurons can identify that face quickly even after several years. The Artificial Neural Networks has the ability to identify person from an trained dataset. The basic function for the face recognition system is to compare the face of a person which is to be recognized with the faces already trained in the Artificial Neural Networks and it recognized the best matching face as output even at different lightening conditions, viewing conditions and facial expressions.

II. PROPOSED SYSTEM

This proposed work is to identify the faces of the humans entering into the industry or organisation and provide entry to the authenticated employee which is faster than the normal way usage of ID CARDS and thumb impression.

The Artificial neural networks concept required to enhance the image and compare it with its original image in the database.

This system uses Eigen faces, artificial neural networks approach to enhance the image and compare it with its original image in database.



Input will be given as an unknown image file. Using PCA algorithm the persons face will be detected and compared with the Gallery Database, using face recognition algorithm it will check if the face matches with the existing registered images. When the image matches with the existing image it will register the person as present in the Attendance Database. If the image does not match with the image stored in the gallery database it will terminate the process and will start recognizing the next inputs. When the user image matches the database image the current log time, date and the attendance will be automatically marked in the database which can be readily accessible in the form of excel sheet.

III. RELATED WORKS

Feature extraction of the human faces by PCA based eigenface approach reduces the high dimensional space into very low dimensions. There are various successful methodologies are purposed in past decades. In 1990, Kirby and Sirovich have shown that the face images can be represented in terms of a best coordinate system termed as "eigenfaces". These are the eigenfunctions of the average covariance of the ensemble of faces. They also purposed that even for large number of faces, the small number of eigenfaces needed. In 1991, M.A. Turk and A.P. Pentland proposed a face recognition method based on the eigenfaces representation of faces. Various feature extraction methods for face images purposed in last years as Linear Discriminant

Analysis (LDA), Kernel methods, Evolutionary Pursuit (EP) Support Vector Machine (SVM) and Artificial Neural Networks(ANN). LDA is a supervised learning algorithm. LDP featuresare obtained by computing the edge response values in all eight directions at each pixel position. All projected sampleswill form the maximum between-class scatter and the minimum within-class scatter simultaneously in the projective feature space. Each face is represented as a collection of LDP codes for face recognition process.

This purposed work explains a complete face recognition system by combining the Principal Components Analysis (PCA) based feature extraction with Artificial Neural Networks (ANN) based detection system for improving the success rate and defining the rejection rate. The work is shown using 49 colored face images database with MATLAB simulation.

IV. FACE DETECTION

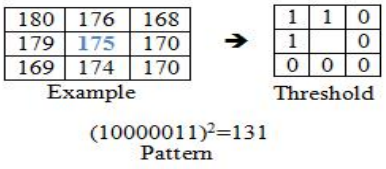
AdaBoost classifier is used with Haar and Local Binary Pattern (LBP) features whereas Support Vector Machine (SVM) classifier is used with Histogram of Oriented Gradients (HOG) features for face detection evaluation.

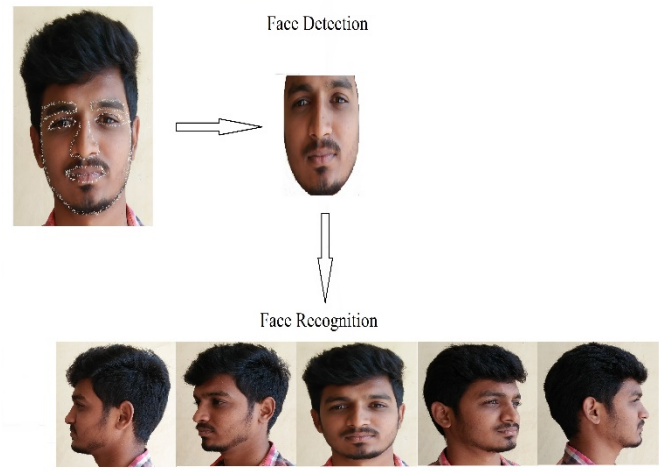
Haar-like features are evaluated through the use of a new image representation that generates a large set of features and uses the boosting algorithm AdaBoost to reduce degenerative tree of the boosted classifiers for robust and fast interferences only simple rectangular Haar-like features are used that provides a number of benefits like sort of ad-hoc domain knowledge is implied as well as a speed increase over pixel based systems, suggestive to Haar basis functions equivalent to intensity difference readings are quite easy to compute. Implementation of a system that used such features would provide a feature set that was far too large, hence the feature set must be only restricted to a small number of critical features which is achieved by boosting algorithm, Adaboost.

The original LBP operator labels the pixels of an image by thresholding the 3-by-3 neighbourhood of each pixel with the centre pixel value and considering the result as a binary number. Each face image can be considered as a composition of micro-patterns which can be effectively detected by the LBP operator. To consider the shape information of faces, they divided face images into N small non-overlapping regions T_0, T_1, ..., T_N. The LBP histograms extracted from each sub-region are then concatenated into a single, spatially enhanced feature histogram defined as:

$$H_{i,j} = \Sigma_{x,y} I(f_l(x,y)=i) I((x,y) \; T_j)$$

where i = 0, ... , L-1; j = 0, ..., N-1. The extracted feature histogram describes the local texture and global shape of face images.





V. FACE RECOGNITION

Eigenfaces considered as 2-D face recognition problem, faces will be mostly upright and frontal. That's why 3-D information about the face is not required that reduces complexity by a significant bit. It convert the face images into a set of basic functions which essentially are the principal components of the face images seeks directions in which it is more efficient to represent the data. This is mainly useful for decrease the computational effort. Each of the new dimensions is a linear combination of pixel values, which form a template. The linear combinations obtained using Fisher's linear discriminant are called Fisherfaces. LBP is an order set of binary comparisons of pixel intensities between the center pixel and its eight surrounding pixels.

$$LBP\,(x_a,y_a) = {}^{7}\Sigma_{n=0} \; s(i_m - i_a)\, 2^n$$

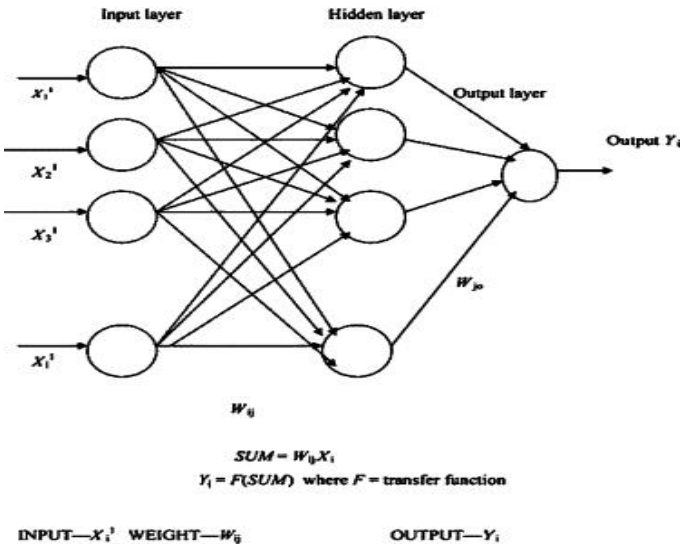
Where i_a corresponds to the value of the center pixel (x_a,y_a), i_m to the value of eight surrounding pixels, function f(x) is defined as:

$$f_{(x)} = \begin{array}{ll} 1 & if \;\; x>=0 \\ 0 & if \;\; x<0 \end{array}$$

As the human brain consist of complex interconnected neurons to process the different task. This neuron does not depend on each other and work in

asynchronous manner. They can resolve the complex and noisy data problems. Artificial Neural Networks (ANN) learns the correlated patterns of input and target values. ANN is inspired by the human biological nervous system.

These layers of processing elements make independent computation of data and pass it to another layer. The computation of processing elements is completed on the basis of weighted sum of the inputs. The output is compared with the target value and the mean square error is calculated which is processed back to the hidden layer to adjust its weights. This process occurs iteration for each layer to minimize the error by repeatedly adjusting the weight of each layer. Hence, it is called the back propagation. The iteration process carried on until the error falls below the tolerance level.



VI. CONCLUSIONS

The purposed face recognition system works with high accuracy and provides better success rateseven for noisy face images. This work also improves the rejection rate for non-human and unknown face images. We have apply the local features extraction methods with Artificial Neural Networks for further improvements in the research of Face Recognition System. This method provides the maximum accuracy of about 95.45% for applied database.

REFERENCES

[1] P.Pounds, R.Mahony, J.Gresham, P.Corke and J. Roberts, “Towards dynamically-favourable quad-rotor aerial robots” in Australian Conference on Robotics and Automation”, Volume 7, pp 691-699, 2004.

[2] G.Hoffman, H.Huang, S.L.Waslander and C.J.Tomlin, “Quad-rotor helicopter flight dynamics and control: Theory and experiment” in Proceedings of the AIAA Guidance. Navigation and Control Conference, Vol. 5(23), pp. 3660-3667, 2007.

[3] Qingsong Zhu, Jiaming Mai, and Ling Shao, “ A Fast Single Image Haze Removal Algorithm Using Attenuation Prior”, IEEE Transactions on Image Processing, Volume 24, November 2015.

[4] Rahul D. Dhotkar, Prakash R. Chandore, Prashant N. Chatur, “Face Recognition Techniques and its application”, IJAIEM, Volume 3, March 2015.

[5] J Lu, K. N. Plataniotis, A. N. Venetsanopoulos, Face recognition using LDA-based algorithms, “IEEE Neural Networks Transaction”, 2003.

[6] K. T. Talele, S. Kadam, A. Tikare, Efficient Face Detection using Adaboost, “IJCA Proc on International Conference in Computational Intelligence”, 2012.