

Classroom Monitoring using Face Recognition and Automation of Taking Attendance using PLC

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Abstract—Face recognition is rising as a lively research area spanning many disciplines like image processing, pattern recognition, computer vision and neural networks. Face recognition technology has various business applications and other commercial. Here this paper presents an automated face recognition using principle component analysis and discrete wavelet transforms in order to take the attendance of the classroom .As a part of the proposed algorithms, Filters of Wavelets have been implemented using multi-resolution approaches due to their flexibility, suitability and regularity for face recognition. After successful recognition of a student face, the system is designed to automatically update the attendance . The proposed system improves the performance of existing attendance management systems by eliminating human intervention, marking and entry of attendance .

Keywords—Biometrics ,Principle component analysis Wavelet transform, Walsh transform.

I. INTRODUCTION

Biometric makes use of the physiological or behavioral characteristics to identify and substantiate the person. In order to overcome human intervention, the biometrics have been automated. Computers and machines used for a purpose of automation. There is uniqueness in the characteristics of the physiological and behavioral measurements. Finger based scan, hand based scan, iris based scan, retina based scan and facial based scan the Physiological biometrics are directly measurements from part of human body. Behavioral biometrics indirectly measure characteristics of the human body. Face isn't simply a collection of face expression rather it is a purposeful thing. It is associate identity of one , other folks adapt to response additional to face than body elements of a human. Among the obtainable biometric techniques face recognition could be a common analysis topic with arrange of applications in many industrial areas together with police work and security, virtual relativity and amusement and human machine interactions. With the emergence of image process technology creating the computers perform face recognition become easier. Maintaining the attendance record in academic institutes is a very important part of enhancing the

standard of education as attending points as value-added at the end of the semester. Conventionally the teachers mark the attendance manually, and they should ensure the correctness of the marked attendance to the individual student. As a result the lecture duration gets wasted and also the proxy attendance cannot be avoided with this conventional attendance taking process.

There are usually two parts in the face recognition algorithms i) face localization and normalization , ii) face identification. Face images and co-ordinates of the center of eye are given for the algorithms which are in part automatic. The face images are given only for the entirely automatic algorithm. There are huge number of techniques which have been applied for the face recognition. The faces were treated as points in the space of high dimension and there calculated the distance of Euclidean between them during former days. The dimensional reduction techniques are added to the problem such as Principle Component Analysis(PCA) in order to reduce the complexity of the recognition techniques.

A further Discrete wavelet transform technique here used to perform the feature extraction. It is popular because of its complete abstract framework , provides flexibility in choosing bases and provides lowest complexity in the computation. Time scale Signal analyzing method used here is wavelet transform its because of its advantage over the multi-resolution analysis. It is the confined analysis of time frequency which has the capacity of local features in the domains of time and frequency. Windows are fixed for the wavelet transforms but for the time and frequency domain the windows can be varied.

II. FOCUS AREA

Since biometrics can be implemented by companies, governments, customs, churches hospitals banks and military (police, army, navy, air force) to verify peoples identity, this paper hereby recommends its use in the academic , Knowledge intensive area (education, industries) ,commercial, production.

III. LITERATURE SURVEY

Olufemi Sunday Adeoye [1], here explores the varied strategies of biometric identification that has evolved over the years and also the features used for every modality. Different types of emerged and emerging technologies related to biometrics are briefly explained. W. Zhao, R. Chellappa, P. J. Phillips a. Rosenfeld[2], this paper explained the latest survey on the face recognition technological researches. It had given the updated review on the research. Pallavi D.Wadkar, Megha Wankhade[3], this paper gives the explanations about the application of Discrete wavelet transform[DWT]. The wavelets have been decomposed into divisions and have been implemented to test the best performances among them.

R. Gottumukkal and V. K.Asari[4], compares conventional PCA approach with modular PCA approach the improved efficiency of the system when applied to them are also explained in detail. Surekha Borra, Nazare Kanchan Jayant[5], here the application of a viola-Jones algorithm for the detection of the face, the drawback here is the restriction of the camera capturing region confined to limited area or field and finding difficulty in capturing of the tilted faces. Samuel Lukas, Aditya Rama Mitra, Erin Ikana Desanti, Dion Krisnadi[6], this paper explains the combined application of the DWT and Discrete cosine transforms[DCT] in order for feature extraction and applying RBF for the classification.

Dr. Pankaj Tomar, Preeti Mehta[7], this paper explains face recognition and automated attendance management using the raspberry Pi camera module and Matlab.

IV. PROPOSED METHODOLOGY

A. Block diagram

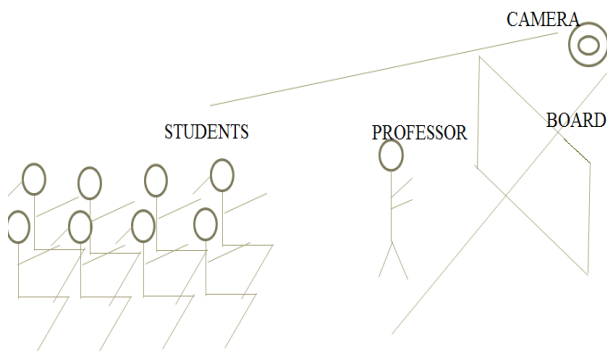


Fig 1. Classroom scenario in automated face recognition.

Above shown Figure 1 explains the classroom scenario. Complete system starts with professor entering the classroom. Each of the class rooms are provided with different ID's. As soon Professor enters the class room the camera starts taking the Pictures in a row, starts processing the data. Students are made to sit in the class facing the board or Professor since system follows the face to face classroom system. The cameras used here can be Bluetooth camera, CCTV , Mobile camera or any other face capturing devices.

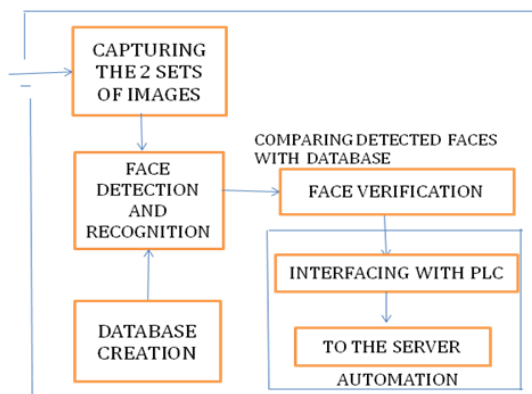


Fig 2. Image processing and face recognition.

Very important role in detecting which classroom ID is played by PLC. The activities like actively sending data, perform Function like bell ringing, sending SMS, counting

the attendance. Data from PLC is then sent to server for the further processing like updating the attendance. Fig 2 explains further processing after the capturing the images.

A. Flow chart

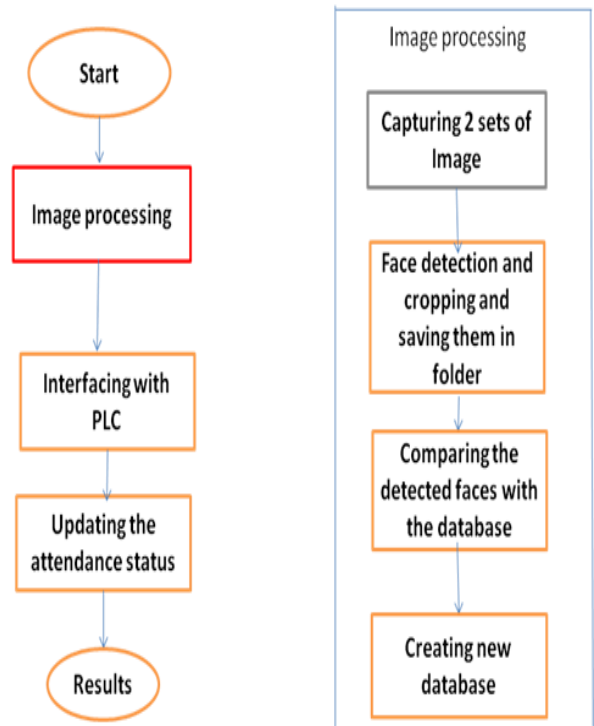


Fig 3. Flow chart of the proposed system and the block diagram. The above Fig 3 explains the flow chart of the complete proposed system and the next block explains the process followed in the image processing of the proposed system

V. IMPLEMENTATION

Following steps will explain the implementation section :

- i) Student’s database creation
- ii) Face detection and Face recognition
- iii) Updating the database with PLC and marking attendance

i) Student’s database creation

Complete database of students is created, In the proposed system the database is initially created for 9 students. Data base will consist the class room's ID, student's ID, Professor's ID. below Fig 4, Fig 5 are the database's created.



Fig 4: Database of 8 student's



Fig 5: Class room images taken from camera

ii) Face detection and Face recognition

skin color based Face detection method is used in proposed system.

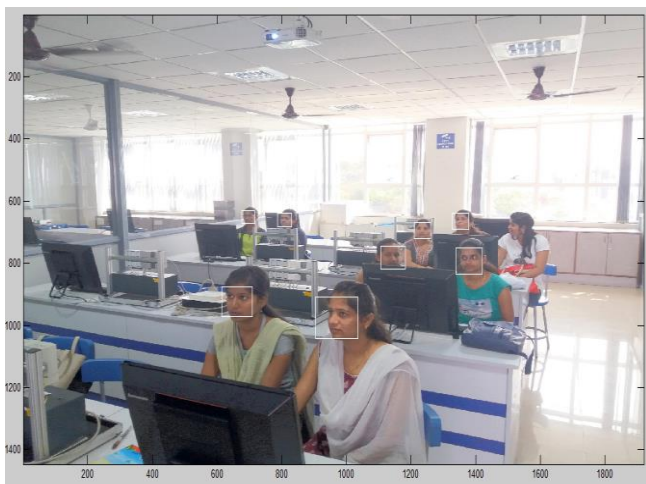


Fig 6: Face detection in a frame with boundary box.

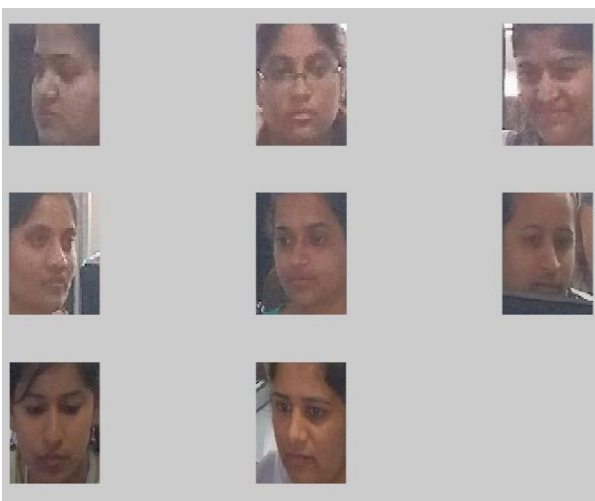


Fig 7: Cropped faces from a single frame

A frame of classroom image is captured with a gap of few minutes. The results for application of the face detection approach is as shown in the Fig 6 and Fig 7.

Face detection depends on the occlusions. In the face recognition the cropped faces are given in to the algorithm as an input. face recognition is directly proportional to the number of detected.

iii) Updating the database with PLC and marking attendance

The results are then updated in the database with the help of the PLC. PLC automates further processing like updating the attendance, bell ringing, sending SMS etc.

VI. CONCLUSIONS

The final outcome will be all in all a single package product which can work as a standalone attendance management system with any human intervention the process of managing and attendance. To eliminate the manual labor involved in recording attendance, an automated Attendance Management System based on face detection and face recognition techniques is proposed. The popular PCA based algorithm and alignment- free partial face recognition algorithm together are used for face detection and recognition. Latter automating the complete system with interfacing it with PLC .

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