

Automatic Attendance Monitoring System Using Face Recognition Techniques

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Abstract- Attendance recording of a student in an academic organization plays a vital role in judging students' performance. As manual labor involved in this process is time consuming, an automated Attendance Management System (AMS) based on face detection and face recognition techniques is proposed in this paper. The system employs modified Viola-Jones algorithm for face detection, and PCA (Principal Component Analysis) face recognition algorithm for face recognition. After successful recognition of a student, the system automatically updates the attendance in the database. The proposed system makes the current attendance management systems more efficient by removing calling, marking and entry of attendance in institutional websites.

Keywords : Face Detection; Face Recognition; Viola-Jones algorithm; Attendance Management Systems, Feature Extraction.

I. INTRODUCTION

Every organization has adopted its own method for AMS. Some continue with the traditional method for taking attendance manually while some have adopted the biometric techniques. The traditional method makes it difficult to verify students one-by-one in a large classroom environment. Moreover, the manual labor involved in computing the attendance percentage becomes a major task. The Radio Frequency Identification (RFID) helps to identify a large number of crowds using radio waves [1]. It has high efficiency and hands-free access control. But it is observed that it can be misused. An automatic biometric system would indeed provide the solution. They include fingerprints, eye retina, voice, etc. However, each biometric method has its own advantages and disadvantages.

Human facial expression recognition has been used in various real life applications such as security systems, interactive computer simulations/designs, computer graphics, psychology and computer vision. The next generation computing like pervasive computing, human computing and ambient intelligence will have to develop user interfaces that readily respond to naturally happening, multi model, human communication. The main motivation for us to go for this project was the slow and inefficient traditional manual attendance system. This made us to think why not make it automated fast and much efficient. Also such face detection techniques are in use by department like crime investigation where they use cctv footages and detect the faces from the crime scene and compare those with criminal database to recognize them. Also Facebook, it uses an algorithm called deep face whose accuracy to recognize is 97.25% which is as close as what humans have that is 97.53%

II. OBJECTIVE OF THE WORK

- The objective of this system is to present an automated system for human face recognition in a real time background for an organization to mark the attendance of their employees or student.
- Build an automated system to increase the accuracy of existing system.

III. LITERATURE SURVEY

Paper 1: Attendance System Using Hybrid Face Recognition Techniques

Author Name: NazareKanchanJayant ,SurekhaBorra

This paper uses Viola and Jones algorithm[1][2] for face detection and correlations formulas for face recognition. Viola and Jones algorithm is used for face detection. Where it is used in both creating database and face recognition process. Where in case creating database it takes input image through a web camera continuously. Captured image undergoes face detection. Detected face will be cropped and stored in database. Where in case of face recognition if there is any movement video surveillance will be used to detect the moving object. The captured image undergoes face detection and further processed later by face recognition.

Dataset used: Pictures taken during admission at PCCOE

Feature extraction techniques: Voila Jones

Advantages: Robust to small changes in the face and its increasing efficiency

Disadvantages: The System overview does not provide the clear idea about components of the overall process.

Paper 2: Introduction to Deep Face Attributes Recognition Using Spatial Transformer Network

Author Name:- Lianzhi Tan, Zhifeng Li, Qiao Yu., 2016 IEEE

To locate face region, instead of locating the fiducial points in the face region, we propose an end-to-end framework, in which spatial transformer network is applied (prior to the classification network) to learn face alignment parameters. The spatial transformer network learns spatial transformation for an image or a feature map. The transformation includes scaling, cropping, rotation and non-rigid deformation. By adding a spatial transformer layer between input layer and classification layers, every input sample is transformed before classified. For example, plane rotated images are transformed to frontal face images, and face regions at the edge of images are transformed to the center area.

Dataset used: CelebA and LFWA

Feature extraction techniques: Spatial Transformer Network

Advantages: Spatial transformer increase efficiency of algorithm. and Improve facial attribute recognition in the wild.

Disadvantages: Increase Overhead due to spatial transformer network.

Paper 3: Fusion of Face Recognition Methods at Score Level

Author Name-CherifiDalila ,DherfaouiFateh , 2016 , IEEE

This paper describes a method for Student's Attendance System which will integrate with the face recognition technology using Personal Component Analysis (PCA) algorithm. The system will record the attendance of the students in class room environment automatically and it will provide the facilities to the faculty to access the information of the students easily by maintaining a log for clock-in and clock-out time. This paper is uses PCA(Principle Component Analysis) technique for face recognition and image compression. The implementation of this project is done using OpenCV libraries for face detection and further processes. PCA method has been widely used in applications such as face recognition and image compression. PCA is a common technique for finding patterns in data, and expressing the data as eigenvector to highlight the similarities and differences between different data. Then the system implementation is divided in three major part Face Detection and Extract, Learn and Train Face Images, Recognise and Identification. Implementation is done using OpenCV libraries which is open source and cross platform.

Dataset used: Set of face images taken at the Artificial Intelligence laboratory of FEI, Brazil

Feature extraction techniques: Principal Component Analysis

Advantages: Insensitive to scale of original data

Disadvantages: The covariance matrix is difficult to be evaluated in an accurate manner

IV. EXISTING SYSTEM APPROACH

The existing biometric attendance system is efficient, reliable and provides a high level of security when compared to the traditional authentication methods. However, these systems offer some disadvantages as well. Most of the devices are unable to enroll some small percentage of users, and the performance of the system can deteriorate over time. To overcome these disadvantages face recognition based authentication techniques are developed. Face recognition technology involves scanning the distinctive features of the human face to authorize the student.

V. PROBLEM STATEMENT

Student's attendances are taken manually by using attendance sheet, which is a time consuming event. Moreover, it is very difficult to verify each student in a large classroom environment with distributed branches whether the authenticated students are actually responding or not. As manual labor involved in this process is time consuming, an automated Attendance Management System (AMS) based on face detection and face recognition techniques is proposed in this paper.

VI. PROPOSED SYSTEM APPROACH

An Automated Attendance Management System (AMS) based on face detection and face recognition techniques is proposed in this paper. The system employs modified Viola-Jones algorithm for face detection, and PCA (Principal Component Analysis) face recognition algorithm for face recognition. After successful recognition of a student, the system automatically updates the attendance in the database. The proposed system improves the performance of existing attendance management systems by eliminating manual calling, marking and entry of attendance in institutional websites.

VII. SYSTEM ARCHITECTURE

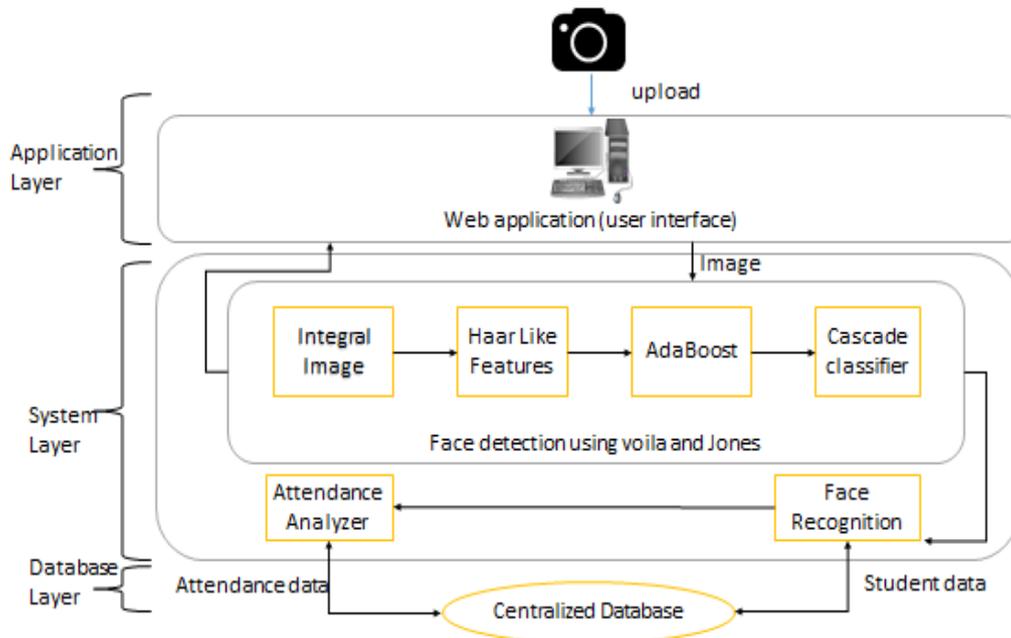


Fig. 3 System Architecture

7.1 Explanation

The System Architecture Consists of basically three layers that is, the Application Layer, the System Layer and the Databases layer.

7.2 Application Layer

There is the capturing phase in this the user captures the frames and using a web app that runs on almost all platforms upload the file to the server.

Authentication is provided to the users. This web app is used to upload captured frames as well as to view the attendance.

7.3 System Layer

This is the layer where the processing is done that is the detection and recognition part at the server side.

1. Viola and Jones algorithm is used to detect images from the frames. Initially an integral image is generated from the frame which simply assigns numbers to the pixels generated by summing up the values. Further to detect the objects from the frames the haar-like feature is generated and as millions of features being generated adaboost(boosting algorithm) is used to enhance the performance.

2. The extracted features are passed through a trained classifier which detects the faces from the objects.

3. These detected faces are cropped and passed through the recognition module which by applying correlation to the cropped images and the images in the databases recognizes the faces.

4. Integral image or summed area table is a data structure and algorithm for quickly and efficiently generating the sum of values in a rectangular subset of a grid. In the image processing it is also known as an integral image.

5. Haar-like features are digital image features used in object recognition. They owe their name to their similarity with haar wavelets and were used in the first real-time face detector.

6. Adaboost(adaptive boost) meta-algorithm formulated by yoavfreund and robertschapire which is use to improve the performance of other algorithm. Viola and jones extracts the millions of features (pixels) for comparison so, we adaboost to enhance the overall performance and calculation speed of the algorithm.

7. Cascade classifier is used which is composed of stages each containing a strong classifier. So all the features are grouped into several stages where each stage has certain number of features.

7.4 Database Layer

The Database layer is a centralized database system which consists of student database and their attendance.

The student database is formed by initial feeding of the frames from which system detects faces crops them and stores it to the database and these stored images are hence forth used for the recognition part. The results of the

face recognition module are compared with the images from the student database and after the successful comparison the attendance is updated to the database. The sheet is generated and uploaded to the web app.

VIII. CONCLUSION

To eliminate the manual labor involved in recording attendance, an automated AMS based on hybrid face detection and face recognition techniques is proposed. The popular Viola-Jones algorithm and alignment-free partial face recognition algorithm together are used for face detection and recognition. Which makes the current attendance management systems more efficient in the numerous ways like Automatic tracking of the records of the students, Minimizing the manual labor and pressure on the lecturers for accurate marking of the attendance, Minimizing the time required for marking attendance and maximizing the time required for actual teaching process, Increase the accuracy of the overall system and Improving the security.

IX. REFERENCES

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