International Journal of Emerging Trends & Technology in Computer Science (IJETTCS)
Web Site: www.ijettcs.org Email: editor@ijettcs.org
Volume 4, Issue 6, November - December 2015 ISSN 2278-6856

A Survey Paper OnAutomated Attendance System

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Abstract

The main objective of developing this system is to present an automated way to keep track of attendance using face detection and recognition technique which would reduce the present black and white method of marking attendance. Replacing the tedious old method this system will save time, reduce the amount of work the administration has to do and will replace the stationery material with electronic apparatus.

Index Terms- Automated Attendance System, Educational institutions, Face Recognition and Detection, Camera.

I.OBJECTIVE

To propose a new automatic attendance marking system, which integrates video surveillance and face recognition algorithms into the process of attendance management. [4]Students attendance is very important task and if taken manually wastes a lot of time. There are too many automatic methods available for this purpose i.e. biometric attendance. All these methods also waste time as students have to make a queue to touch their thumb on the scanning device. In our systemcamera attached in front of classroom that is continuously capturing images of students, detect their faces in images and compares the detected faces with the database and mark the attendance of each individual student.

Maintaining the attendance record is very important in all the institutes for checking the performance of students. Face recognition consists of two steps, in first step faces are detected in the image and then these detected faces are compared with the database for verification. A number of methods have been proposed for face detection i.e. AdaBoost algorithm, the FloatBoost algorithm, Neural Networks, the S-AdaBoost algorithm, Support Vector Machines (SVM), and the Bayes classifier. The efficiency of face recognition algorithm can be increased with the fast face detection algorithm.

II.SYSTEM CONFIGURATION

The Proposed system will be designed using Java connected with an unstructured database like MongoDB.

1. Software Specifications:

(a) Windows 7 and above
(b) Latest Java JDK
(c) MongoDB.

2. Hardware Specifications:

(a) Will require 10GB of Hard disk space
(b) 2 GB of RAM
(c) Camera 16MP (HD)
(d) Light Sensor.
(e) Proximity Sensor.

III.PROPOSED SYSTEM

We propose a model for attendance management system in which we have two databases one is storage database and the other is known as student database. The storage database contains the already stored images and the masks calculated by the facial fiducial points of the students such that of nose eyes and lips mainly. The other database known as attendance database will be used to mark the attendance of the students. A camera will be fixed at the entrance of the classroom, at such an angle where the picture of the students entering can be taken .Gabor Filters or Jets will be applied after that through which every individual students 31 facial Fiducial points will be calculated and then they will be matched to the image information stored in the storage database. This all computation will be headed on the server. Once the matches are done, the student's attendance is marked to solve the issue of validation of the student present in the class or not.

IV.EXISTING SYSTEM

The main purpose of the research is to analyze the solutions given by others and considering the shortcomings of their proposed systems, bring out a better solution. The basic approach taken to tackle the hindrances of attendance marking through facial recognition is to match the images taken recently with those images deliberately captured and placed in the central database.

This table covers papers that are related to this area and an overview of all the papers discussed is given here we discuss mainly their problems and limitations. The figure above is the architecture of the automated attendance sys

Table 1: Existing Systems.

Author	Computational Cost	Implementation	Accuracy	Problem	Summary
N Baloch et al.(2012)	High	No	Less	Accuracy of the system to mark attendance by matching images only	Images matching after noised or background removal
Agni Dika et al.(2010)	High	Yes	Less	Fixed placement of the student exchange the seat easily able to mark proxy attendance	Attendance on basis of position
A.jha et al.(2012)	High	No	Less	Accuracy of the system depends on validation of the attending student	Taking weighted masks and then match scoring is done to mark the student present
A.Saha et al.(2012)	High	No	Less	Repeated image capturing of images and unknown person also added to the DB automatically	Eigen values and Eigen Vectors are used to do face recognition
F.A.Pujol et al.(2012)	High	Yes	High	Heavy computational cost due to usage of data mining techniques	Weighted masks are made by the colours the most greyest area is the most significant to match the images
V.Muthu. A et al.(2013)	High	Yes	Less	Less accuracy due to large number of people and the more pictures the heavier the database which SQL is unable to manage so has a very heavy computational cost	Picture taken noise and background removed matched with the stored image and marks attendance

V.SYSTEM ARCHITECTURE

This automatic attendance marking system integrates video surveillance and face recognition algorithms into the process of attendance management. The system is implemented using a non-intrusive web camera installed at the entrance of room, if there is any movement, proximity sensor placed at entrance gets activated and image is captured. The captured image undergoes face detection and faces recognition, and extracts all faces from the acquired images. After faces have been extracted, they are compared with an existing database of student images and upon successful recognition a student attendance list is generated and saved on a database.

[1]This work is being carried out in five stages:

1. Image Capture

The Camera is mounted at a distance from the entrance to capture the frontal images of the students. The captured image is preferred to be of the size 640x480 to avoid resizing of the image in the back-end as we observed resizing may sometimes results in poor performance.

2. Face Detection

A proper and efficient face detection algorithm always enhances the performance of face recognition systems. Various algorithms are proposed for face detection such as Face geometry based methods, Feature Invariant methods, Machine learning based methods.

3. Pre-processing

The detected face is extracted and subjected to pre-processing. This pre-processing step involves with histogram equalization of the extracted face image and is resized to 100x100. Histogram Equalization is the most common Histogram Normalization technique. This improves the contrast of the image as it stretches the range of the intensities in an image by making it clearer.

4. Feature Extraction and Classification:

The performance of a Face Recognition system also depends upon the feature extraction and their classification to get the accurate results. Feature extraction is achieved using feature based techniques or holistic techniques. In some holistic techniques we can make use of dimensionality reduction before classification. We compared the results of different holistic approaches used for feature extraction and classification in real time scenario.

5. Post-processing

In the proposed system, after recognizing the faces of the students, the names are updated into an excel sheet. At the end of the class a provision to announce the names of all students who are present in the class is also included. This is implemented using text to speech conversion. The system is also equipped with the facility of sending notification mail to the absentees when that facility is enabled.

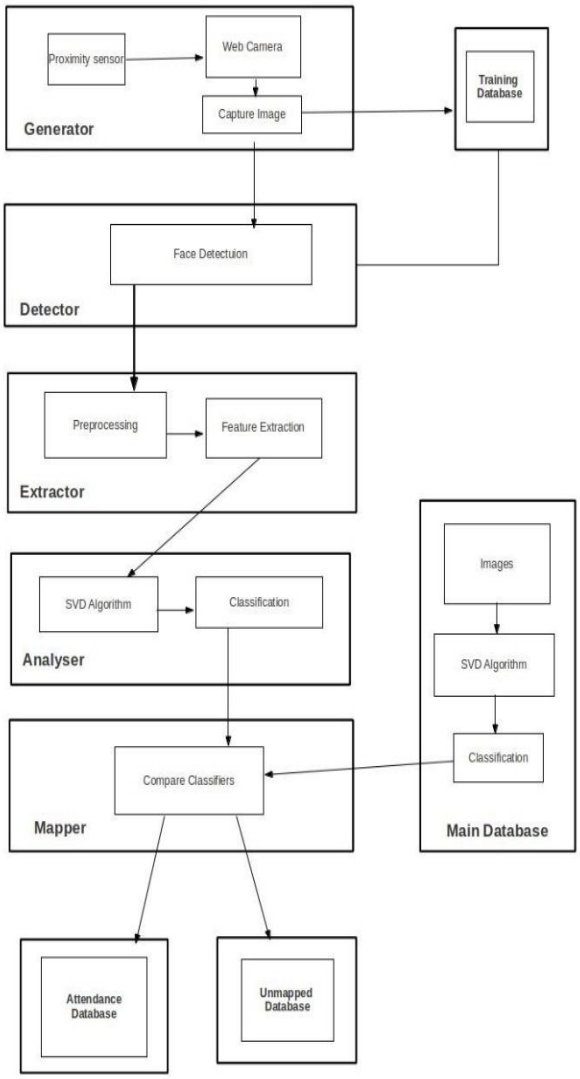

Figure 1: System Architecture.

I.MATHEMATICAL MODEL:

System= {Input, processing, output}

Input:

Input={C, S_I, T_I, S}

C=Captured images.

S_I = {student id, student names}

T_I = {teacher id, teachers names}

S= {slots for each subject}

Processing:

Processing= {D, P, F, A, M}

D= {face detection}

P= {Pre-processing}

[6]Compute the mean face image Ψ by

$$\Psi = (\frac{1}{N})\sum_{j=1}^{k}\sum_{i=1}^{Ni} F_i^{(j)}$$

F= {Feature Extraction}

[6]Apply SVD on Ψ such that

$$\Psi = USV^t = \sum_{i=1}^{k} \sigma_i u_i v_i^t$$

Where k = min {m, n}. Denote that U = [u_1, u_2, · · ·, u_m], V = [v_1, v_2, · · ·, v_n],

$$\sigma_1 \geq \sigma_2 \geq \cdots \geq \sigma_k \geq 0.$$

[6]Each training face image 1 is transformed into a face feature matrix $X_i^{(j)} \in R^{r \times c}$ by:

$$X_i^{(j)} = U_r^t F_i^{(j)} V_c$$

Where r and c are user-specified and U_r = [u_1, u_2, · · · ,u_r], V_c = [v_1, v_2, · · · , v_c].

[6]A test face image T $\in R^{m \times n}$ is transformed into a face feature matrix Y $\in R^{r \times c}$ by

$$Y = U_r^t T V_c$$

A= {Analyser}

[6]Compute the distance between a test face imageT and a training face images $X_i^{(j)}$ by

$$R_{ji} = \delta(Y, X_i^{(j)}) = Y - X_i^{(j)}{}_F, \text{ a Frobenius norm.}$$

M= {Mapper}

[6]Retrieve the top 8 subjects of the database according to the rank of Rji by argRankj

$$\{R_{ji} = \delta(Y, X_i^{(j)}),\ 1 \leq i \leq N_j\}$$

Output:

Output= {U, G}

U= {updated database with attendance mapped.}

G= {Defaulters list generated.}

VII.SCOPE AND ADVANTAGES

Automated attendance management is a very active topic of research. A lot of work has been done in this field and there is a lot to improve. Being one of the most successful applications of the image processing, face recognition has a vital role in technical field especially in the field of security purpose. Human face recognition is an important field for verification purpose especially in the case of student's attendance. This project is aimed at implementing a digitized system for attendance recording. Current attendance marking methods are monotonous & time consuming. Manually recorded attendance can be easily manipulated. Hence this method is proposed to tackle all these issues.

VIII.INNOVATIVENESS AND USEFULNESS

In today's world many automated attendance systems have been implemented to reduce the paper work and save time. The innovativeness of our project is that we are implementing the use of sensors that would improve the efficiency of camera. Camera is the heart of our project without which this concept of no use. Therefore it is important to maintain the efficiency of camera. Keeping the camera throughout may create problems as it would cause overhead if kept on for a long time. Sensors when implemented would help us to put on and off the camera. When the motion is sensed by the sensor the camera will turn on and take the snapshot else it would remain off. Market Potential and Competitive Advantage: For security reasons, we can use detection & recognition system. To identify culprits on bus stations, railway stations 7 other public places, we can use this system. This will be helping hand to the police. In this system, we will use GSM module. Suppose if culprit is detected, then detected signal can be transmitted using GSM module to the central control room of police station.

IX.FEASIBILITY STUDY

Three key considerations are involved in the feasibility analysis:

1. Economic Feasibility
2. Technical Feasibility
3. Social Feasibility

Considering the above keys, feasibility of this project can be understood from the following points:

1. Reduces manual effort.
2. Keeps track of a student's attendance correctly and gives the result.
3. Implementation of camera and sensors make this project totally automated.
4. Easy to be implemented in educational or commercial institutes.
5. Real time operations are done.
6. Images that are to be compared with the snaps taken by the camera can be easily stored in the database.
7. On the basic of this method, results such as defaulters list, students lecture wise n total attendance in percentage and count can be calculated and access to these results can be made available for teachers as well as students to keep track of their respective attendance.

X.CONCLUSION

On the basis of this method results such as defaulters list, student's lecture wise, total attendance in percentage and count can be calculated and access to the results can be made available for teachers as well as students to keep track of their respective attendance using face recognition and detection algorithm.

ACKNOWLEDGMENT

Our thanks to the experts who have contributed towards survey of this paper.

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