Automated Attendance System

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Abstract - *Uniqueness or individuality of an individual is his or her face. In this project face of an individual is used for the purpose of attendance making automatically. As we know that attendance of the student is very important for every college, universities and school. Traditional methodology for taking attendance is by calling the name or roll number of the student and the attendance is recorded. There is lot of time consumption in this process. To reduce these losses, an automatic process is used in this project which is based on image processing. Initially video clip of classroom is taken and is stored in the database, and these video is converted to frames or images, then we apply Face detection techniques such as Ada-boost algorithm to detect the faces in frames or images and then features are extracted of detected face by using Haar Cascade algorithm. This system first stores the faces of the students in the database. During face recognition the detected faces are compared with the faces stored in the database. If the system recognizes faces, the attendance gets marked immediately of recognized faces.*

Key Words: (Size 10 & Bold) Key word1, Key word2, Key word3, etc (Minimum 5 to 8 key words)…

1.INTRODUCTION

Maintaining the attendance is very important and compulsory in all the institutes for checking the performance of students. There are many automatic methods available for this purpose i.e. biometric attendance, finger printing. All these methods also requires lot of time because students have to make a queue to touch their thumb on the scanning device. When it comes to schools and universities, the attendance monitoring system is a great help for parents and teachers both. The registers could easily be exploited by students and if information was mailed to the parents, there were high chances that mails could be made to disappear before parents even saw them. With the monitoring system in place, the information can easily be printed or a soft copy can be sent directly to parents in their personal email accounts. Hence, we proposed An Automatic Attendance system for students.

2. Problem Statement

The traditional manual methods of monitoring student attendance in lectures are tedious and complicated as the signed attendance sheets have to be manually logged in to a computer system for analysis. Therefore this is tedious, time consuming and prone to inaccuracies as some students in the department often marks proxy of their college, rendering this method ineffective in tracking the students' class attendance. Use of the face detection and recognition system in lieu of the traditional methods will provide a fast and effective method of capturing student attendance accurately while offering a secure, stable and robust storage of the system records. Where upon authorization; one can access them for purposes like administration, parents or even the students themselves [7].

3. Project Scope

The system we have developed is successfully able to accomplish the task of marking the attendance in the classroom automatically and output is obtained in the desired format. Another important aspect where we can work towards creating an online data base of the attendance and its automatic updating, keeping in mind growing population of internet of things.

4. Working

An image will be capture from a camera which is predominantly checked for certain constraints like lightning, spacing, density, facial expressions. Form the captured image, from an every object we detect only frontal faces from Haar Cascade algorithm which detects only the frontal face posture of an every individual from the captured image, then the features are extracted. These extracted features are matched with extracted features from database. If the match is found, the attendance is marked.

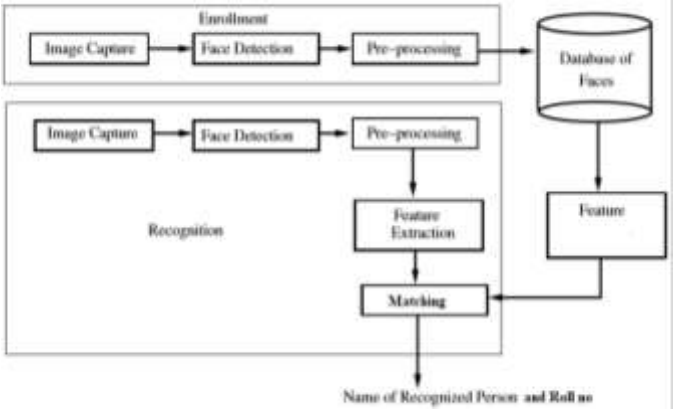


Fig -1: System Architecture

4.1. Algorithm

Haar Cascade is a machine learning object detection algorithm used to identify objects in an image or video and based on the concept of features proposed by Paul Viola and Michael Jones in their paper "Rapid Object Detection using a Boosted

Cascade of Simple Features" in 2001. It is a machine learning based approach where a cascade function is trained from a lot of positive and negative images. It is then used to detect objects in other images. The algorithm has four stages:

1. Haar Feature Selection
2. Creating Integral Images
3. Adaboost Training
4. Cascading Classifiers

4.1.1. Haar Feature Selection

First step is to collect the Haar Features. A Haar feature considers adjacent rectangular regions at a specific location in a detection window, sums up the pixel intensities in each region and calculates the difference between these sums [3]. Haar Feature selection is shown in Figure 2.

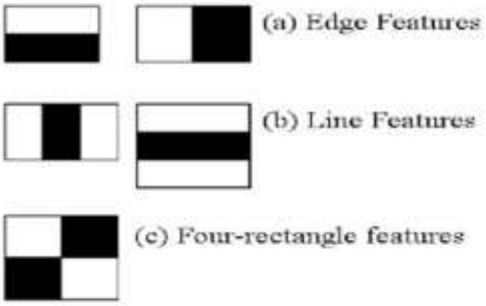


Fig -2: Haar Feature Selection

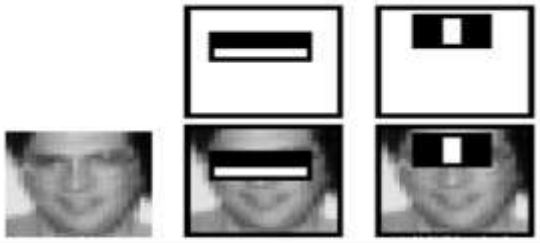
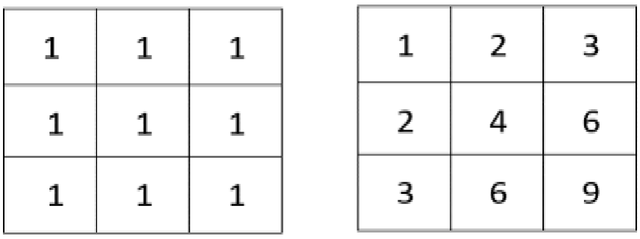


Fig -3: Haar Feature Selection

4.1.2. Creating Integral Images

Integral Images are used to make the execution superfast. But among all the features we calculated, most of them are irrelevant. For example, consider the Figure 3. Top row shows two good features. The first feature selected seems to focus on the property that the region of the eyes is often darker than the region of the nose and cheeks. The second feature selected relies on the property that the eyes are darker than the bridge of the nose. But the same windows applying on cheeks or any other place is irrelevant. Integral image calculation is shown in Figure 4.



1	1	1
1	1	1
1	1	1

1	2	3
2	4	6
3	6	9

Fig -1: Integral Images

4.1.3. Adaboost Training

So how do we select the best features out of so many features generated? This is accomplished using a concept called Adaboost selects the best features and trains the classifiers that use them. This algorithm constructs a “strong” classifier as a linear combination of weighted simple “weak” classifiers. The process is as follows. During the detection phase, a window of the target size is moved over the input image, and for each subsection of the image and Haar features are calculated. The difference is then compared to a learned threshold that separates non-objects from objects. Because each Haar feature is only a "weak classifier" (its detection quality is slightly better than random guessing) a large number of Haar features are necessary to describe an object with sufficient accuracy and are therefore organized into cascade classifiers to form a strong classifier[4].

4.1.4 Cascading Classifier

The cascade classifier consists of a collection of stages, where each stage is an ensemble of weak learners. The weak learners are simple classifiers called decision stumps. Each stage is trained using a technique called boosting. Boosting provides the ability to train a highly accurate classifier by taking a weighted average of the decisions made by the weak learners.

Each stage of the classifier labels the region defined by the current location of the sliding window as either positive or negative. Positive indicates that an object was found and negative indicates no objects were found. If the label is negative, the classification of this region is complete, and the detector slides the window to the next location as shown in the Figure 4.4. If the label is positive, the classifier passes the region to the next stage. The detector reports an object found at the current window location when the final stage classifies the region as positive.

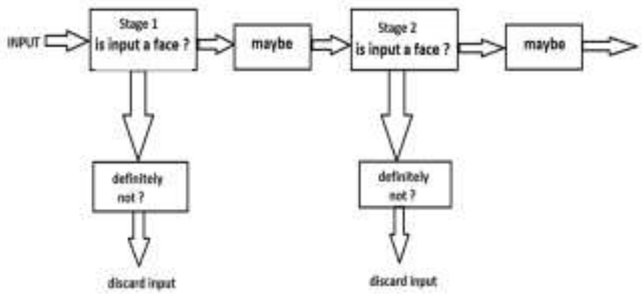


Fig -2: Cascading Classifier

5. Technical Specification

5.1 Advantages

- No more time fraud.
- Better security.
- Easy Integration.
- Reduces the risk of manual errors.

5.2 Disadvantages

- Difficulties in recognizing the face in poor light.
- Troubles with images size and quality
- Strong influence of the camera and position of camera.
- Requirement of Wi-Fi or internet connection availability in every class.

5.3 Software Requirements

- Ubuntu Operating System.
- Django.
- Haar Cascade Algorithm.
- Open CV Python Library.

5.4 Hardware Requirements

- Ubuntu 64 bit Operating System
- 8GB RAM
- 2TB HDD
- Webcam

Conclusions

It can be concluded that a reliable, secure, fast and an efficient class management system is developed replacing a manual and unreliable system.

Most of the existing systems are time consuming and require a semi manual work from the teacher or students. We conclude image processing based student attendance system using Open CV tool as software for image processing and attendance is provided to the students.

Our approach aims to solve the issues by integrating face recognition in the process. The system can be enhanced in such a way that the accuracy, detection rate and recognition rate can be increased so that more number of students can be detected and recognized for those who are present in the class.

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