**ATTENDANCE USING REAL TIME FACE RECOGNITION**

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**PROBLEM STATEMENT**

Taking attendance in school/universities has always been a time consuming and hectic task for both the teachers and students as well. We aim to simplify this task to make it seamless and convenient for both the parties involved. Traditional methods to take attendance by calling out each individual’s name is very inconvenient as well as time wasting as it wastes the precious time of the lecture allocated for the study of the students.

**TEAM MEMBERS**

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**INTRODUCTION**

For a long time now all the teachers and students all across the world have been bothered by the very inconvenient method of taking attendance in the school/universities. Teachers are bothered by this as the traditional procedure of calling each individual’s name takes a lot of time and it wastes their precious time of their lectures.

Through our app we will simplify this process by making it seamless for the students and the teachers as well. It will also avoid any confusion in attendance and will be fully automatic in noting the entry and both the exit time of the students and marking them present for the same. It will save the precious study time of the both the parties and will increase productivity as well.

**TECHNOLOGIES USED**

* Python programming language
* PyCharm IDE
* NumPy Python Library
* OpenCV Python Library
* Face Recognition Python Library
* MS Excel

**LITERATURE REVIEW**

In paper [1] requirements and conditions for the visitor identification system are outlined and an example system is proposed. Two main subsystems: face detection and face recognition are described. Algorithm for face detection integrates skin-colour, mask analysis, facial features (fast and effective way of eyes localization is presented), reductors, knowledge and template matching. For face recognition a three-stage algorithm is proposed. It utilizes well known methods connected in a sequential mode. To improve accuracy and speed some modifications to original methods were proposed and new one presented. The aim was to build a visitor identification system which would be able to operate in mode with a camera and present results in real-time. The emphasis on speed and accuracy was stressed.

The paper [2] describes a face detection framework that is capable of processing images extremely rapidly while achieving high detection rates. There are three key contributions. The first is the introduction of a new image representation called the “Integral Image” which allows the features used by our detector to be computed very quickly. The second is a simple and efficient classifier which is built using the AdaBoost learning algorithm (Freund and Schapire, 1995) to select a small number of critical visual features from a very large set of potential features. The third contribution is a method for combining classifiers in a “cascade” which allows background regions of the image to be quickly discarded while spending more computation on promising face-like regions. A set of experiments in the domain of face detection is presented. The system yields face detection performance comparable to the best previous systems (Sung and Poggio, 1998; Rowley et al., 1998; Schneiderman and Kanade, 2000; Roth et al., 2000). Implemented on a conventional desktop, face detection proceeds at 15 frames per second.

In recent years considerable progress has been made in the area of face recognition. Through the development of techniques like eigenfaces, computers can now compete favourably with humans in many faces recognition tasks, particularly those in which large databases of faces must be searched. Whilst these methods perform extremely well under constrained conditions, the problem of face recognition under gross variations in expression, view, and lighting remains largely unsolved. This paper details the design of a real-time face recognition system aimed at operating in less constrained environments. The system is capable of single scale recognition with an accuracy of 94% at 2 frames-per- second. A description of the system's performance and the issues and problems faced during its development is given[3].

The paper[4] presents an automated system for human face recognition in a real time background world for a large homemade dataset of persons face. The task is very difficult as the real time background subtraction in an image is still a challenge. Addition to this there is a huge variation in human face image in terms of size, pose and expression. The system proposed collapses most of this variance. To detect real time human face AdaBoost with Haar cascade is used and a simple fast PCA and LDA is used to recognize the faces detected. The matched face is then used to mark attendance in the laboratory, in our case. This biometric system is a real time attendance system based on the human face recognition with a simple and fast algorithm and gaining a high accuracy rate.

The Local Binary Pattern Histogram (LBPH) algorithm is a simple solution on face recognition problem, which can recognize both front face and side face. However, the recognition rate of LBPH algorithm under the conditions of illumination diversification, expression variation and attitude deflection are decreased. To solve this problem, a modified LBPH algorithm based on pixel neighbourhood grab median (MLBPH) is proposed. The Gray value of the pixel is replaced by the median value of its neighbourhood sampling value, and then the feature value is extracted by the sub blocks and the statistical histogram is established to form the MLBPH feature dictionary, which is used to recognize the human face identity compared with test image. Experiments are carried on FERET standard face database and the creation of new face database, and the results show that MLBPH algorithm is superior to LBPH algorithm in recognition rate[5].

**PROJECT DESCRIPTION**

In this project we are creating a effective and easy to use attendance system which will be very easy to use for the teacher. It will take a real time video feed from video cameras set up at the door of the class. From this real time feed, faces will be recognised from the database which will already have faces of all the students along with their respective details. The face which will be recognised, its name will be called up through the speakers and his name will be printed on the screen in front of the teacher. Thus, the student’s attendance will be marked without needing any extra effort from the student’s side or the teacher’s side.

We will be using python and its libraries to implement the project.

**PROJECT IMPLEMENTATION**

In the project we have 3 different modules namely:

* faceStore module
* Trainer module
* Recognise module

**FACE STORE MODULE**

As the name suggests this module is used to store the photos of the students in a database which are then used to identify them in the video feed. It uses cv2 python library to link with the camera feed and then take photos of the subject. It takes black and white photos of the subject to work with the trainer module.

We can change the number of photos that can be taken of each subject to adjust the accuracy as well as memory usage of the system. We found the sweet spot to be 60 photos for each subject as it also helps to keep and program fast as well as efficient while not having to lose out on accuracy. The process of capturing photos is fairly simple as the subject just has to look into the camera for about 5 seconds. All the photos taken are then stored securely into a folder. These photos are then provided an id which is unique to each subject.

**TRAINER MODULE**

All the photos captured by the face store module are then used by the trainer module to create a xml file for each of the subject. It uses Local Binary Pattern Histogram (LBPH) algorithm to create an yml file for each subject that stores the unique characteristics of each subject. This file is then used by the recognise module to identify the subject which will be detected in the video camera feed. The Local Binary Pattern Histogram (LBPH) algorithm is a simple solution on face recognition problem, which can recognize both front face and side face. However, the recognition rate of LBPH algorithm under the conditions of illumination diversification, expression variation and attitude deflection are decreased.

**RECOGNISE MODULE**

This module is the main module which is run to recognise the subjects in the direct video which comes from the video camera and then recognises the name of the subjects in real time using the yml files that were created by the trainer module which contain all the unique characteristics of all the students.

It uses cascade identifier module of the cv2 library to predict the name of the person in the video feed. It then guesses the name of the subject with some accuracy level. If the accuracy level is below 40 then the person will be marked unknown. If the accuracy is between 40 to 70 then the subject’s name will appear on top of his name and if the level is above 60 then the speaker will call out the student’s name and present.

When the program is ended by the teacher then on the screen will be displayed the names of the present students. Below that will be the names of the absentees and then there will be a summary of the number of students present and the number of absent students.

**CONCLUSION**

We successfully made an app that will ease out the cumbersome process of taking attendance in the schools and universities. All it takes is a onetime effort to take and store the photos of each of the students one by one. Then the cameras need to be placed at the doors of the class then the attendance of each of the student will be marked automatically. The program being simple and easy to use will be very effective to free up the precious time of the students as well as teachers.

**LIMITATIONS**

The limitations of the app being the camera quality which will severely affect the accuracy of the program in detecting the face of the students. The other limitation being the Local Binary Pattern Histogram (LBPH) algorithm used to predict the name of the subject. This algorithm is simple and effective enough but the accuracy of the program largely depends on this algorithm. A different more accurate algorithm may be used in the future to increase the effectiveness of the program.

**FUTURE SCOPE**

In future a different algorithm maybe used which will be more effective than the one being used currently. It will greatly increase the effectiveness of the system. Other future scope of the system will the that the names can be marked in an excel ready to use format along with the time noted of each of the subject.

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