

Automatic Attendance Management System Using Face Recognition

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Abstract:

Today managing and marking proper attendance of an individual is an important part of our society. The salaries and grades are provided on the basis of attendance of the individual. Traditionally attendance is marked manually by teachers and they must make sure correct attendance is marked for respective student. This whole process wastes some of lecture time and part of correct information is missed due to Human error. Also, it will be a tedious job to maintain the record for the users. The human effort is more here. The retrieval of the information is not easy as the records are maintained in the hand written registers. To overcome these issues Attendance management system using face recognition can be used to provide a faster and secure system to manage and retrieve the Attendance. Attendance monitoring system will save a lot of time and energy for the both parties students as well as the class teachers. LBPH Algorithm will be used for facial recognition.

Keywords – Attendance Management System, LBPH, Haar Cascade, MySQL

1: Introduction:

In the times of modern technologies emerging at fast pace there is no reason why a crucial event in educational sector such as marking attendance should be done in the old boring traditional way. Attendance system of old practices are not quite effective in now a day for keeping track on student's attendance. Students' registration in schools and colleges is increasing year by year and marking each student attendance plays a very vital role. So, it is necessary to discuss the

Efficient system which can record the attendance of an individual automatically. There are many biometric systems available for the purpose but the key authentication is same in all techniques. Every system consists of registration process in which the unique details of a person are stored in the database and after that, there are some algorithms for the processes of identification and verification of the person. These processes then compare the biometric details of a person with previously stored details captured at the time of registration of an individual. Biometric details can be of various types like Fingerprints, Eye Iris, voice etc.

Automatic Attendance monitoring system will help a lot to reduce time and energy for the both students as well as the class teachers. Also, there exists some problems in conventional method of marking system using face recognition. Attendance will be monitored by the face recognition algorithm by detecting the face of the person from the rest of the objects and then marking them as present.

The system will be provided with the images of all the persons and with the help of this pre feed data the algorithm will detect those who are present by matching the features with the already saved images of them saved in the database. This system will consist of a GUI application which will contain a login page for security reasons. Inside the application we can enter the details of students with their images which will be stored in MySQL database. System will use the images stored along with the data of student to detect faces in real time and mark the attendance in excel sheet which can be downloaded by the application. Liveness detection will be used to avoid frauds.

2: Literature Review:

This part of the literature study ultimately presents some facts based on the speculative study of many writers who work in this way. We have examined many research papers based on Attendance Management System.

First research paper we have examined is named as "Biometric Based Attendance" which was published by Mr. Yash Mittal, Ms. Prachi Agrawal and Mr. Kapil Matani. In this research paper Biometric is scaled up for real time deployment, it provides solution of late coming.

The second research paper named as "Finger Based Attendance Management with SMS Alert to Parents" which was published by Ms. Poonam Choudhary, Prof. G.N. Dhoot and Mr. Sopan Borale. This research paper introduced system including terminal fingerprint module, attendance module and SMS system for alerting parents for updating about the presence their child.

The third research paper named as "Smart attendance Management and Learning System" which was published by Prof. H.B. Sale, Priyanka Shelake, Tufail Siddiqui. This paper provides facility of notes dictation, defaulter list, notification, notes view, and details view for students, staff, teachers and Admin.

The fourth paper named as "Key Authentication Based Door lock Monitoring System" which was published by Chinmay Kulkarni, Avinash Bagul and Pranamy Korde. This project concentrated more on automation of institute security that provides lesser security than actual physical security.

3: Proposed Methodology:

In the following section, we will talk about the designing and building of system. There are following three consecutive steps which comprise,

- Haar Cascade Algorithm
- Local Binary Pattern
- Data Flow Diagram

3.1 : Haar Cascade Algorithm:

The basis of Haar classifier object detection is the detection of Haar-like features. These features, instead of using the intensity values of pixels, uses the change in contrast values between adjacent rectangular groups of the pixels. The contrast variance between the pixel groups is used to determine the relatively light and dark areas. Two or three adjacent groups with a relative contrast variance forms a Haar like feature. Haar like features are used to detect an image. Haar like features can easily be scaled by increasing or decreasing the size of the pixel group being viewed. This allows features to become useful to detect various objects of various sizes.

The cascading of the classifiers allows the sub-images with the highest possible probability to be analyzed for all Haar-features that distinguish an object. Cascading also allows one to vary the accuracy of a classifier. One can increase both false alarm rate and positive hit rate by lowering the number of stages. The inverse of this is also true. Viola and Jones were able to achieve a 90% accuracy rate for the detection of a human face using only 100 simple features. Detecting human facial features, such as the eyes, mouth, lips, and nose require that Haar classifier cascades are trained first. In order to train the classifiers, the gentle AdaBoost algorithm and Haar feature algorithms must be implemented. Fortunately, Intel developed an open-source library specially for easing the implementation of computer vision related programs called Open Computer Vision Library (OpenCV). The OpenCV library is designed to be used in conjunction with applications that pertain to the field of robotics, biometrics, image processing, human computer interface, and other areas where visualization is very important and includes an implementation of Haar classifier detection and training. Thus, with help of these algorithms system will detect the person's face in the video.

3.2 : Local Binary Pattern:

Local Binary Pattern (LBP) is a very easy and effective texture operator which labels the pixel of an image by thresholding the neighborhood of each pixel and contemplate the result as a binary number.

It was described first in 1994 (LBP) and since has been found to be a powerful feature for texture classification. It has been determined further that when LBP is combined with histograms of oriented gradients (HOG) descriptor, it improves the detection performance greatly on some datasets. By using the LBP combined with histograms we can easily represent the face images with a simple data vector.

Parameters: The LBPH basically uses 4 parameters:

- Radius: the radius is generally used to build the circular local binary pattern and it also represent the radius around the central pixel. Usually, it is set to 1.
- Neighbors: the neighbors can be number of sample points to build the circular local binary pattern. the more sample points are included, the higher is the computational cost. Usually, it is set to 8.
- Grid X: The grid will be finer if the number of cells are more, the dimensionality of the resulting feature vector will also be higher. Usually, it is set to 8.
- Grid Y: This represents the number of cells in the vertical direction. The grid will be finer if the number of cells are more, the dimensionality of the resulting feature vector will also be higher. Usually, it is set to 8.

Training the Algorithm: First, the algorithm needs to be trained. To train it, we need to use datasets with the facial images of the individuals we want to recognize. We also need to set an ID for each image, so that the algorithm uses this information

highlighting the facial features. To do it, the algorithm uses a concept of a sliding window, based on the parameter's radius and neighbors.

3.3 : Dataflow Diagram

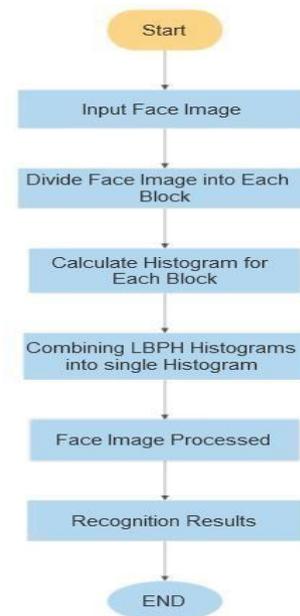


Fig1. Dataflow diagram

to recognize an input image and give an output image. Images of the same individual should have the same ID.

Applying the LBP operation: The first major step for the LBP is to create an intermediate image that describes the original image in improvised way, by

4: Results & Discussion:

- The Attendance Management System is developed using Machine Learning, meets the objectives of the system which it has been developed. The system is in steady state where all bugs and errors have been resolved. The system is operated at a high level of efficiency. The system solves the problem for which it was intended. It was intended to solve as requirement specification.
- The system can recognize and identify the face well with an accuracy of 85 %, at a face distance 40 cm from the camera with adequate lighting.
- The system can mark the Attendance of an individual and Spreadsheet containing the attendance can be downloaded from the application.
- The end product is a secure, fast and reliable software to mark attendance.

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