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Smart attendance system: Engineering College Prospective

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Abstract

Computer vision has been studied from many perspectives. It expands from raw data recording into techniques and ideas combining digital image processing, pattern recognition, and machine learning and computer graphics. The wide usage has attracted many scholars to integrate with many disciplines and fields. This paper provides a survey of the recent technologies and theoretical concept explaining the development of smart attendance system related to image processing using different areas of their field application. Computer vision helps scholars to analyze images and video to obtain necessary information, understand information on events.

Face detection and face recognition are very important technologies these days, furthermore we noticed that they got have a variety of uses such as cell phones, army uses, and some high-risk information offices. We decided to make a device that detects and recognize the face as a student attendance system and can be a substitute for the regular paper attendance system and finger print attendance system.

Face identification has been considered an interesting research domain in the past few years as it plays a major biometric authentication role in several applications including attendance management and access control systems. Attendance management systems are very important to all organization though they are complex and time-consuming for managing regular attendance log. There are many automated human identification techniques such as biometrics, RFID, eye tracking, voice recognition. Face is one of the most broadly used biometrics for human identity authentication.

Keywords: — ***Image Quality, Machine Learning, EDM, HaarCascade.***

I.Introduction

Smart attendance system is a **computer-based student attendance management system** which will assist the faculty for maintaining attendance record automatically. In this project we have implemented the automated attendance system using PYTHON. We have projected our ideas to implement “Automated Attendance System Based on Facial Recognition”, in which it imbibes large applications. The application includes face identification, which saves time and eliminates

chances of proxy attendance because of the face authorization. Here we are detecting faces from live videos. The machine learning algorithm Haarcascades helps in detecting the faces from given inputs. We have created a CSV file that stores the images as training data.

Here we are using OpenCV (open-source library) in python that allows us to operate various graphical functions as well as algorithm and data sets. HaarCascade uses a matching phase while training to match the appropriate anchor box with the bounding boxes of each ground truth objects within an image. Essentially HaarCascade find the highest overlapped area within a frame and predicts the data for the faces detected.

II.EXPLORATORY DATA ANALYSIS (EDA)

Facial recognition system along with suitable hardware and software will help meet the goals of this project. Facial recognition system is a derived innovation of image processing. Image processing deals with the extraction of needy data that can be related to digital image and in technology advancement it plays a unique role.

- First of all, we have to detect the faces from the live or real time video and attendance is marked.
- Here the faces of all the persons should registered 1st.

III. STUDY OF THE SYSTEM

In this part we will propose a method that will give an overview of the approach to our project and the ways it should be done. As the previous work was not enough which led us to the development in this project in the most feasible and efficient way possible. The proposed face detection module for this project is Viola jones algorithm. Also, for face recognition modules which are proposed for this project is neural network architecture.

Plenty of research has been conducted so far on the various available methods for implementation of an effective attendance monitoring system. These methods vary in terms of the types of input method used, the types of data processing employed and the controllers used to implement the systems. In this section looking for the various available solution with the advantages and disadvantages of each.

In the face detection and recognition system, the process flow is initiated by being able to detect the facial features from a camera or a picture store in a memory.

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IV. PROBLEM STATEMENT AND OBJECTIVE

1. Problem Statement

Face identification has been considered an interesting research domain in the past few years as it plays a major biometric authentication role in several applications including attendance management and access control systems. Attendance management systems are very important to all organization though they are complex and time-consuming for managing regular attendance log. There are many automated human identification techniques such as biometrics, RFID, eye tracking, voice recognition. Face is one of the most broadly used biometrics for human identity authentication.

2. Objectives

The main objectives are:

1. To make attendance simpler.
2. Reducing time wastage during conventional class attendance.
3. Get extra time for learning and efficiency of class teaching.
4. Automating the whole process so that we have digital environment.
5. Reduce the use of paper, make the system environment friendly.
6. To obtain proxy attendances zero.
7. Encouraging the use of technology in daily lives.

V. PROPOSED SYSTEM

1. Data Preprocessing

We created our own dataset as we didn't find any dataset online containing 60 images for each person. There are consists of 18 individuals with 60 images of each that have been taken for this project. Additional 10 individuals are considered for testing recognition of unknown persons.We tested our system using a live real-time video in which students and unknown persons come and stand in front of the camera. Fig. 3 shows a few images after the pre-processing stage.

2. Preprocessing and Face detection

First, we convert the frame from colour to grayscale. To detect the faces, we used a haar cascade classifier which is proposed in [8] where a cascade function is trained and detect features in other images. For this, we use haar features like edge, line, and four-rectangle. For a large image or variable size of an image, it takes a lot of computations and features and most of them will be irrelevant. But AdaBoost manages to select the best out of many as shown in Fig. 4 [9]. Then Region Of Interest (ROI) i.e. containing faces is extracted and sent to next stage.

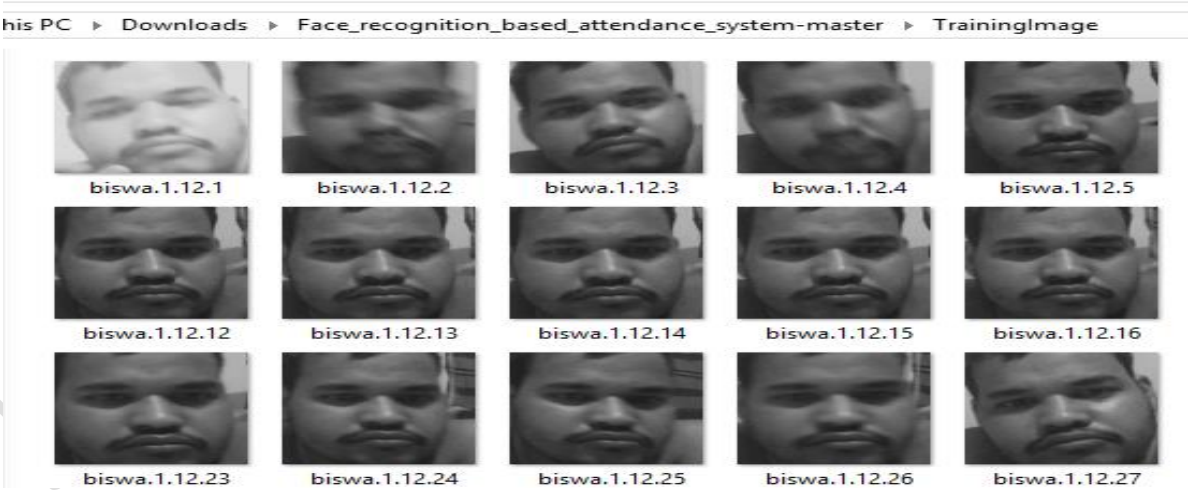
3. Face recognition

For face recognition, we decided to use the LBPH algorithm because of its robustness, the capability to recognize both front and side faces and better compared to Eigen faces and Fisher faces [6]. The LBPH algorithm is used as they find characteristics that best describe a face in an image [5].They were many face recognition algorithms and the LPBH algorithm is better. This method is easier, within the sense it characterizes the image within the dataset locally and when placement are unknown image occurs we perform an equivalent algorithm and compare the result to each of the pictures within the dataset. It works better in different environments and light conditions than other algorithms.

4. Postprocessing

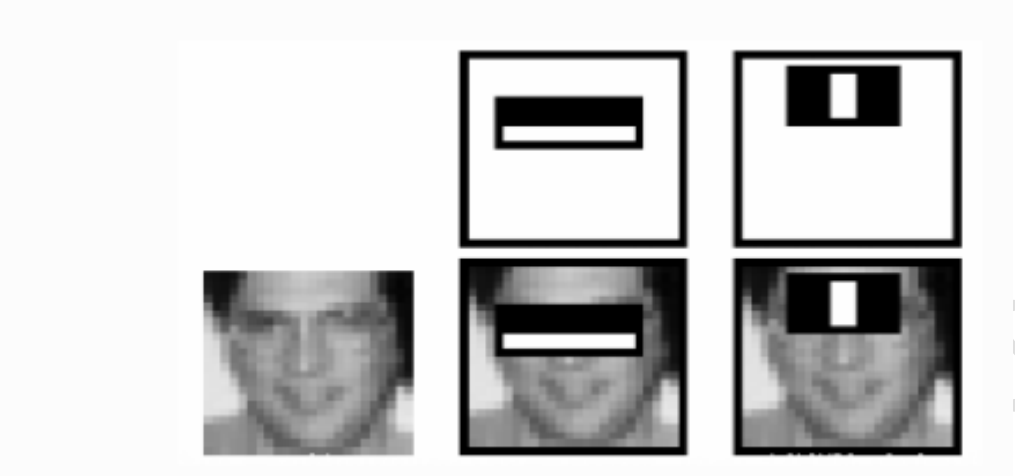
Now to recognize the person in the image it compares (by applying Euclidean distance) the new histogram with the histograms from the training dataset and choose the histogram having lowest confidence i.e. least distance, as lower confidences are better and also extract the ID corresponding to that histogram. If confidence is less than 50 then details belong to the extracted ID is shown on the frame [11] as in Fig. 7, the names are updated into an excel sheet only if the student name is not in the excel sheet to avoid duplicate names as in Fig. 8. Else word ”Unknown” is shown on the frame and if confidence is greater than the threshold which is given value 95, then the person’s image is saved in a separate folder. This helps in identifying any intruders in the class and reduces the wrong classification of students to an unknown person.

VI. PREPROCESSED FACES AS DATA



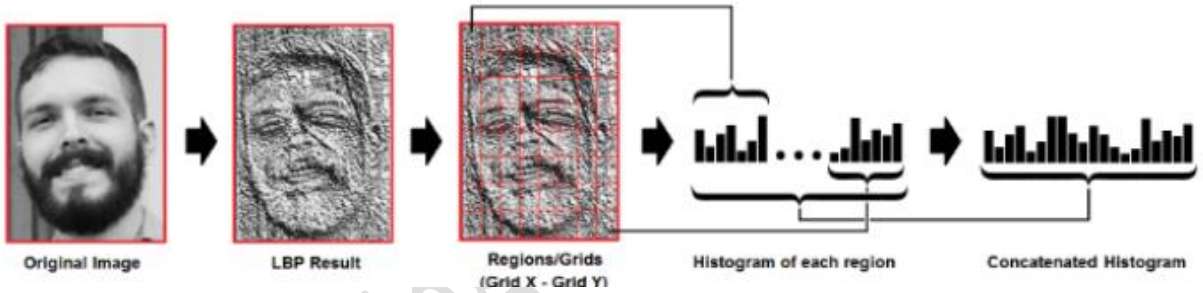
(Fig. 1. extracted and pre-processed faces of students in the dataset.)

VII. HAAR FEATURES



(Fig. 2. example of relevant Haar features.)

VIII. LBPH ALGORITHM ON AN IMAGE



(Fig. 3. process of LBPH algorithm on an image.)

IX. CONCLUSION

LBPH is one of the prominent techniques for face recognition. Our system successfully recognizes a student with unintentional changes like wearing glasses or growing beard. Here the problem is the dataset is small. In future, an effort could be made to build a better dataset, that might practically give a more accurate result. We can improve haar cascade classifiers through the synthesis of new training examples which can improve the recognition rate of unknown persons. A system alert (voice and visual) can be included if an intruder is detected in the class.

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