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Face Recognition Based Attendance Marking System

Shilpa V, Sushma H M, Swetha G
School of Computer and information Technology, Reva University, Bangalore, Karnataka, India

ABSTRACT

Facial recognition is an important human ability; an infant innately responds to face shapes at birth and can discriminate his or her mother's face from strangers at the tender age of 45hours. Recognizing and identifying people is a vital survival skill, as is reading faces for evidence of ill health or deception. Improving significantly in the last several years ,technologies that can mimic or improve human abilities to recognize and read faces are now maturing for use in medical and security applications, and also face recognition is a billion dollar industry companies like Google photos(Google), Facebook, Flickr, Instagram, Photo bucket, iCloud photo library(Apple) are extensively using face recognition for identifying particular person, for grouping pictures of same person, and also for facial expression analysis. However, face recognition is a complex process, it includes challenges like illumination, pose, angle, noise, and even expressions, which make face recognition tedious process.

Keywords : Computer Vision, Object Tracking, Face Recognition, Python and Django

I. INTRODUCTION

Normally lecturer takes attendance by calling the names of each student and marks the attendance in record[1]. The lecturer has to perform manual computation to obtain the student's attendance percentage, which normally consume a lot of time. Some students may answer for another student's name without knowledge. This might lead to a student losing their attendance. Another issue of having the record in a hardcopy form is that a lecturer may lose the sheet[2]. Sometimes students will misuse by saying proxy to their friends who are absent.

This paper introduces a new automatic attendance management marking system using face recognition. This system eliminates risk of teacher calling each student name and marking attendance. Face recognition is a technique of biometric recognition. It is considered one of the most successful applications of image analysis and processing; That is the main reason behind the great attention it has been given in the past several years. The facial recognition process can be divided into two main stages: processing before detection where face detection and alignment take place and afterwards recognition occur through feature extraction and matching steps. This system uses the face recognition approach for the automatic attendance of students in the classroom. Attendance is marked by using a camera that captures images of group of students in classroom, detects the faces in images and compare the detected faces with the images in database[3].

II. RELATED WORK

Through the research of a bunch of IEEE papers and a few other articles it has made evident that smart face recognition attendance system using python has

a great potential in research and it is used in many industrial applications.

Two researchers Visar Shehu and Agni Dika proposed in a system which introduces an attendance marking system, which integrates computer vision and face recognition algorithms into the process of attendance management. The system is implemented using a non-intrusive digital camera installed on a classroom, which scans the room, detects 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. This paper addresses problems such as real time face detection on environments with multiple objects, face recognition algorithms as well as social and pedagogical issues with the applied techniques.

III. METHODOLOGY

- Teacher should login.
- Register the details of students with image.
- Capture image of group of students.

Step after capturing the images:

- Calculating the integral image- summed area table necessary for quick calculation.
- The algorithm- creates a small set of only the best features to create classifiers that are more efficient.
- Cascade Filter- discards negative windows early to focus more computational time on possible positive windows

A. MODULE DESIGN

Implementation is divided into three different modules

1. Face detection
2. Face Recognition
3. Updating Attendance

Description of each module

1. Face Detection:

Face detection is achieved using Viola & Jones face detection algorithm. Viola & jones algorithm has four stages,

- Harr Feature Selection
- Creating an Internal Image
- Ad boost Training
- Cascading Classifiers
- Harr Feature Selection: All human faces share some similar properties. These regularities may be matched using Harr Features.
  - A few properties common to human faces:
- The eye region is darker than the upper-cheeks.
- The nose bridge region is brighter than the eyes.
  - Composition of properties forming match able facial features:
  - Location and size: eyes, mouth, bridge of nose
  - Value: oriented gradients of pixel intensities
  - The four features matched by this algorithm are then sought in the image of a face are given in below images.
  - Rectangle features:

Value = Σ (pixels in black area) - Σ (pixels in white area)

- Three types: two-, three-, four-rectangles, Viola & Jones used two-rectangle features

For example: the difference in brightness between the white &black rectangles over a Specific area
Each feature is related to a special location in the sub-window.

2. Face Recognition

Mean Square Error (MSE) is used for face recognition. Images will be considered as training set in the Database. Reference images are the images in the database and the captured image in class is considered as live image. The live image of particular person from the captured image will be compared with reference images. Then the face will be detected from live and reference images by Viola jones algorithm. Let (a, b) pixels be the face detected from live image and let (p, q) pixels be the face detected from the reference image. Both live image and reference image pixels should be of same size, only then MSE can be calculated. If both are not of same size, the images will get converted automatically into same size. Now we add up the pixels and find MSE by using MSE= $\mu D2 - \mu R2$ .if MSE>threshold, student's face will be identified and their attendance will be marked.

3. Updating Attendance

The professor face with the subject name will be stored in the database from the previous stage, face is recognized and person's name is identified. Now, extract the USN from the database and updates the attendance in system database with respect to each subject details.

Face detection is a useful task in many applications such as video conferencing, human machine interfaces, Content Based Image Retrieval (CBIR), surveillance systems etc. The first step of automatic face recognition is to determine the presence of faces (if any) in the input image. The output of a face detection step is face region along with size and location.

B. DATA FLOW DIAGRAM

Face detection is a useful task in many applications such as video conferencing, human machine interfaces, Content Based Image Retrieval (CBIR), surveillance systems etc. It is also often used in the first step of automatic face recognition by determining the presence of faces (if any) in the input image (or video sequence). The face region including its location and size is the output of a face detection step.

In general, the face recognition problem (in computer replace vision) can be formulated as follows: Given still or video images of a scene, determine their place presence of faces and then identify or verify one or more faces in the scene using a stored database of faces. Thus, the accuracy of a face recognition system is depended on the accuracy of the face detection system. However, the variability of the appearance in the face patterns makes it a difficult task. A robust face detector should be able to find the faces regardless of their number, colour, positions, occlusions, orientations, a facial expressions, etc. Although this issue is still an unsolved problem, many methods have been proposed for detecting faces. Additionally, colour and motion, when available, may be characteristics in face detection. Even if the disadvantages of colour based methods like sensitivity on varying lighting conditions make them not as robust methods, they can still be easily used as a pre-processing step in face detection. The image-based techniques rely on a face in. By using training schemes and learning algorithms, the data can be classified into face or non-face groups. Here, a brief summary feature and image based techniques will be presented.

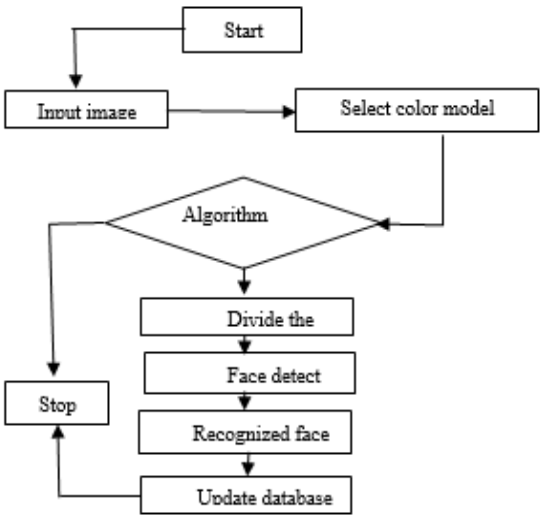

Fig. 1: Work flow diagram

By training the face recognition system with pictures of people with different angles below results are obtained in which as the number of trained images increases (5,10, 15) accuracy rate or confidence level also increased.

The results conclude that the, as the number of training images increases the confidence level and the accuracy of the system increases. System is also tested for different face angles and it can recognize faces up to 600.

It is noticed that when the system is tested with an image contain six students, system recognized five of the students giving efficiency of 70%.

IV. CONCLUSION AND FUTURE SCOPE

The existing system are extensive variety of strategies, for example, biometric, RFID based and so forth which are time consuming and non-efficient. To overcome that, above framework is the better and reliable solution from every perceptive of time and security. In this way we have accomplished to add a reliable and effective participation framework to distinguish faces in classroom and recognize the faces accurately and attendance. The scope of the project is the system on which the software is installed, i.e. and it will work for a particular institute.

The future work is to eventually improve the recognition rate of algorithms when there are unintentional changes in a person looks like tonsuring head, using scarf, beard. The system developed only recognizes face up to 45 degrees angle variations, which has to be improved further. In environments, which have low variations, adaptation could bring very significant improvements to face recognition.

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