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Automated class attendance system based on multi face recognition using deep learning method

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ABSTRACT

Automatic Multiface recognition (AMFR) technologies have seen dramatic improvements in performance over the past years, and such systems are now widely used for security and commercial applications. An automated system for Multi human face recognition in a real time background for a college to mark the attendance of their employees. So Smart Attendance using Real Time Face Recognition is a real world solution which comes with day to day activities of handling employees. The task is very difficult as the real time background subtraction in an image is still a challenge. To detect real time human face are used and a simple fast Principal Component Analysis has used to recognize the faces detected with a high accuracy rate. The matched face is used to mark attendance of the employee. Our system maintains the attendance records of employees automatically. Manual entering of attendance in logbooks becomes a difficult task and it also wastes the time. So we designed an efficient module that comprises of face recognition to manage the attendance records of employees. Our module enrolls the staff's face (3). This enrolling is a onetime process and their face will be stored in the database. During enrolling of face we require a system since it is a onetime process. You can have your own roll number as your employee id which will be unique for each employee. The presence of each employee will be updated in a database. The results showed improved performance over manual attendance management system. Attendance is marked after employee identification. This product gives much more solutions with accurate results in user interactive manner rather than existing attendance and leave management systems.

Keywords: Face Recognition, Histogram Of Gradients (HoG), Neural Network, Attendance Sheet, IOT (Internet of Things)

INTRODUCTION

Image processing is any form of signal processing for which the input is an image, such as a photograph or video frame; the output of image processing may be either an image or a set of characteristics or parameters related to the image. Image processing is classified into two types. They are,

1. Analog image processing
2. Digital image processing

Analog image processing is any image processing task conducted on two dimensional analog signals. Digital image processing is the use

of computer algorithms or perform image processing on digital images. Digital image processing generally refers to processing of a two dimensional picture by a digital computer.

Student attendance record plays a important role in every school, college and university. Student attendance can be classified into two types [1-5].

They are,

1. Manual Attendance System
2. Automated Attendance System

The manual attendance system is very difficult for faculty to verify and maintain each and every student record in large class environment and

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requires more time for calculating the average and recording the attendance of each student. The automated attendance system will extract the face image when student enters the classroom and marks the attendance automatically. This project is based on Face Recognition technique. A face recognition system is a computer application for identifying or verifying a person automatically from a digital image or a video frame from a video source. Facial Recognition algorithms identify facial features by extracting landmarks, or features, from an image of the subject's face. For example, an algorithm may analyze the relative position, size, and/or shape of the eyes, nose, cheekbones, and jaw. These features are then used to search for other images with matching features. Recognition algorithms are Principal Component Analysis (PCA) using eigen faces, Linear Discriminate Analysis, Elastic Bunch Graph Matching using the Fisher face algorithm, Hidden Markov model, Multi-linear Subspace Learning using tensor representation, and neuronal motivated dynamic link matching [6-10].

SYSTEM OVERVIEW

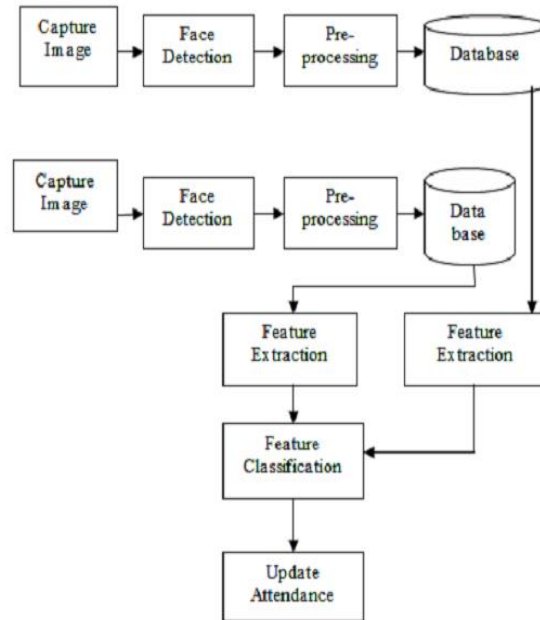
Face recognition system is to identify a person using his face image. Face recognition module that recognizes the individual student's face and update the student attendance database automatically. The first step is that, the staff and student class representative are provided with their own Username and Password to Log-in. Next step is, the training image and their features are stored in the database. Then, testing image features are compared with the training images. Once the image is identified, the attendance will be registered. Finally, the attendance details of the student are send to staff and parent through E-Mail.

METHODOLOGY

1. Camera captures the image of a classroom. The faces are detected and cropped.
2. Cropped images are processed using Eigen face recognition algorithm.
3. The students whose faces are recognized are marked as present and the results are transferred to an excel sheet automatically.



PORPOSED BLOCK DIAGRAM



VIOLA-JONES ALGORITHM

The problem to be solved is detection of faces in an image. A human can do this easily, but a computer needs precise instructions and constraints. To make the task more manageable, Viola-Jones requires full view frontal upright faces. Thus in order to be detected, the entire face must point towards the camera and should not be tilted to either side. While it seems these constraints could diminish the algorithm's utility somewhat, because the detection step is most often followed by a recognition step, in practice these limits on pose are quite acceptable.

The algorithm has four stages:

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

The features sought by the detection framework universally involve the sums of image pixels within rectangular areas. As such, they bear some resemblance to Haar basis functions, which have been used previously in the realm of image-based object detection. However, since the features used by Viola and Jones all rely on more than one rectangular area, they are generally more complex. The figure on the right illustrates the four different

types of features used in the framework. The value of any given feature is the sum of the pixels within clear rectangles subtracted from the sum of the pixels within shaded rectangles. Rectangular features of this sort are primitive when compared to alternatives such as steerable filters. Although they are sensitive to vertical and horizontal features, their feedback is considerably coarser.

HISTOGRAM OF GRADIENTS (HOG)

- The **histogram of oriented gradients (HOG)** is a feature descriptor used in computer vision and image processing for the purpose of object detection.
- The technique counts occurrences of gradient orientation in localized portions of an image.
- This method is similar to that of edge orientation histograms, scale-invariant feature transform descriptors, and shape contexts, but differs in that it is computed on a dense grid of uniformly spaced cells and uses overlapping local contrast normalization for improved accuracy.

Feature extraction

- Feature Extraction is applied to both training and testing images. It is used to extract the features of image. Feature Extraction is done using PCA Algorithm.
- PCA is used in Face recognition for finding patterns. Eigen faces approach is a principal component analysis method which is used to describe the variation between face images.
- Eigen faces approach is used due to its simplicity, speed and learning capability. Using

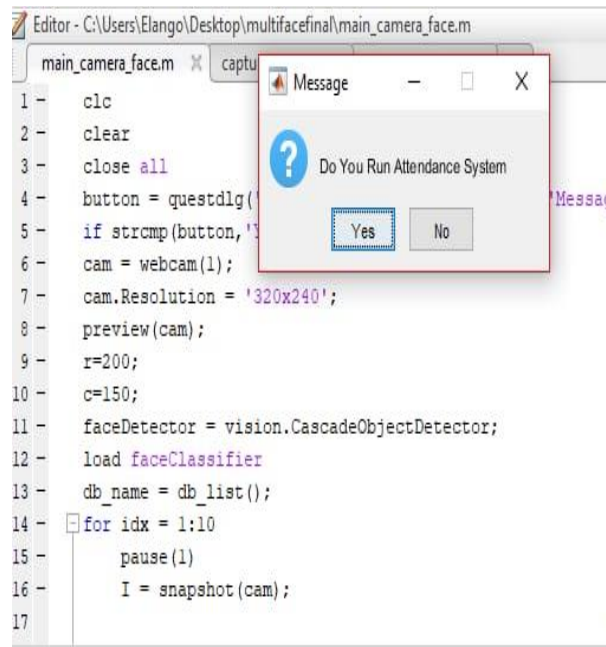
Eigen face method, the images are represented as vectors instead of using Matrix representation.

Internet of things (IOT)

- IOT means Internet of things. Internet of things is a machine to machine communication and it covers variety of protocols. The protocol used here is SMTP (Simple Mail Transfer Protocol).
- This protocol is used to send mail over the internet. Using IOT, the attendance of the student is sent to their staffs and HOD.

RESULT AND ANALYSIS

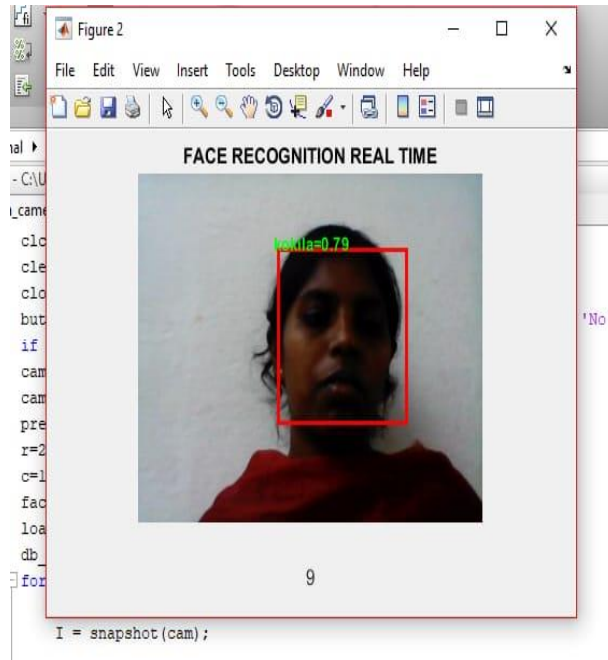
Home window



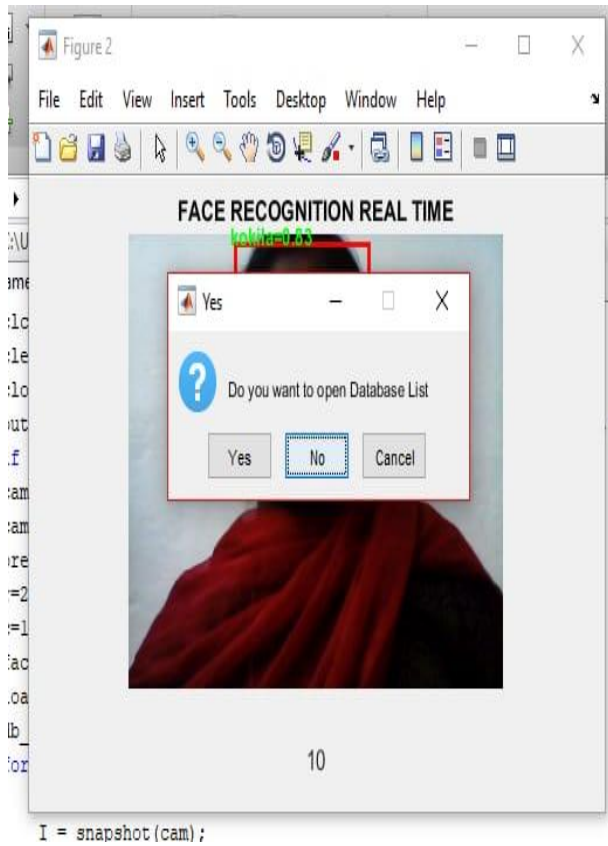
```

Editor - C:\Users\Elango\Desktop\multifacefinal\main_camera_face.m
main_camera_face.m x captu
1 -   clc
2 -   clear
3 -   close all
4 -   button = questdlg('Do You Run Attendance System','Yes','No');
5 -   if strcmp(button,'Yes')
6 -       cam = webcam(1);
7 -       cam.Resolution = '320x240';
8 -       preview(cam);
9 -       r=200;
10 -      c=150;
11 -      faceDetector = vision.CascadeObjectDetector;
12 -      load faceClassifier
13 -      db_name = db_list();
14 -      for idx = 1:10
15 -          pause(1)
16 -          I = snapshot(cam);
17
  
```

Feature Extraction and Classification



After time user need of open attendance sheet



Attendance sheet

	A	B	C	D	E	F
1	kokila	present	17:5:2019,17:24:54			
2	sathguru	absent				
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						

Advantages

- Easy integration
- Simple algorithm
- Easy to use output format
- Proxy attendance is eliminated
- Saves time

Applications

- All educational institutions
- Virtual classrooms
- Offices

FUTURE SCOPE

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

CONCLUSION

In the system we have implemented an attendance system for a lecture, section or laboratory by which lecturer or teaching assistant can record student attendance. Its saves time and effort, especially if it is a lecture with huge number of students. In order to obtain the attendance of individual student, this paper proposes the automatic attendance system based on face recognition technique using Personal Component Analysis (PCA) algorithm. The system will record the student attendance when he\she enters and exit the classroom automatically and also provide additional information to faculty by maintaining a log report for entry and exit time. Using SMTP protocol, student's attendance is sent to their parents through mail. By using this method the calculated attendance will be more effective and time saving. Comparing to manual attendance system this provides more reliable solution. In further work, our system can be used in mobile based face recognition. It can be implemented in real time applications using CCTV camera. Instead of PCA algorithm, various recognition algorithms can be implemented for effective results.

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