Anchor Cascade For Efficient Face Detection

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Abstract- *The face is one of the easiest ways to distinguish the individual identity of each other. Face recognition is a personal identification system that uses personal characteristics of a person to identify the person's identity. Human face recognition procedure basically consists of two phases, namely face detection, where this process takes place very rapidly in humans, except under conditions where the object is located at a short distance away, the next is the introduction, which recognizes a face as individuals. Stage is then replicated and developed as a model for facial image recognition (face recognition) is one of the much-studied biometrics technologies and developed by experts.Uniqueness or individuality of an individual is his face. In this project, the face of an individual is used for the purpose of attendance making automatically. Attendance of the student is very important for every college, universities and school.Conventional methodology for taking attendance is by calling the name or roll number of the student and the attendance is recorded.Time consumption for this purpose is an important point of concern. Assume that the duration for one subject is around 60 minutes or 1 hour & to record attendance takes 5 to 10 minutes. For every tutor this is consumption of time. To stay away from these losses, an automatic process is used in this project which is based on image processing.In this project face detection and face recognition is used. Face detection is used to locate the position of face region and face recognition is used for marking the understudy's attendance. The database of all the students in the class is stored and when the face of the individual student matches with one of the faces stored in the database then the attendance is recorded.*

I. INTRODUCTION

Face recognition is the task of identifying an already detected object as a known or unknown face. Often the problem of face recognition is confused with the problem of face detection Face Recognition on the other hand is to decide if the "face" is someone known, or unknown, using for this purpose a database of faces in order to validate this input face.
Humans have been using physical characteristics such as face, voice, etc. to recognize each other for thousands of years. With new advances in technology, biometrics has become an emerging technology for recognizing individuals using their biological traits. Now, biometrics is becoming part of day to day life, where a person is recognized by his/her personal biological characteristics. Our goal is to develop an inexpensive security surveillance system, which will be able to detect and identify facial and body characteristics in adverse weather conditions. There are many factors which influence this type of methods i.e. lighting condition background noise, fog and rain.

Maintaining attendance is very important in all learning institutes for checking the performance of students. In most learning institutions, student attendances are manually taken by the use of attendance sheets issued by the department heads as part of regulation. The students sign in these sheets which are then filled or manually logged in to a computer for future analysis. This method is tedious, time consuming and inaccurate as some students often sign for their absent colleagues. This method also makes it difficult to track the attendance of individual students in a large classroom environment. In this project, we propose the design and use of a face detection and recognition system to automatically detect students attending a lecture in a classroom and mark their attendance by recognizing their faces.

While other biometric methods of identification (such as iris scans or fingerprints) can be more accurate, students usually have to queue for long at the time they enter the classroom. Face recognition is chosen owing to its non-intrusive nature and familiarity as people primarily recognize other people based on their facial features. This (facial) biometric system will consist of an enrollment process in which the unique features of a persons' face will be stored in a database and then the processes of identification and verification. In these, the detected face in an image (obtained from the camera) will be compared with the previously stored faces captured at the time of enrollment.

II. WHAT IS FACE RECOGNITION?

Face recognition is the task of identifying an already detected object as a known or unknown face.Often the problem of face recognition is confused with the problem of face detection.

Face Detection is to identify an object as a "face" and locate it in the input image.

Face Recognition on the other hand is to decide if the "face" is someone known, or unknown, using for this purpose a database of faces in order to validate this input face.

The face is our primary focus of attention in social life playing an important role in conveying identity and emotions. We can recognize a number of faces learned throughout our lifespan and identify faces at a glance even after years of separation. This skill is quite robust despite large variations in visual stimulus due to changing condition, aging and distractions such as beard, glasses or changes in hairstyle.

Computational models of face recognition are interesting because they can contribute not only to theoretical knowledge but also to practical applications. Computers that detect and recognize faces could be applied to a wide variety of tasks including criminal identification, security system, image and film processing, identity verification, tagging purposes and human-computers.

Unfortunately, developing a computational model of face detection and recognition is quite difficult because faces are complex, multidimensional and meaningful visual stimuli. Face detection is used in many places nowadays especially the websites hosting images like Picasa, photo bucket and facebook. The automatically tagging feature adds a new dimension to sharing pictures among the people who are in the picture and also gives the idea to other people about who the person is in the image. In our project, we have studied and implemented a pretty simple but very effective face detection algorithm which takes human skin color into account.

Our aim, which we believe we have reached, was to develop a method of face recognition that is fast, robust, reasonably simple and accurate with a relatively simple and easy to understand algorithms and techniques. The examples provided in this thesis are real-time and taken from our own surroundings.

III.BACKGROUND INTRODUCTION

The current method that colleges use is that the faculty passes a sheet or makes roll calls and marks the attendance of the students and this sheet further goes to the admin department with updates in the final excel sheet. This process is quite hectic and time consuming. Also, for professors or employees at institutes or organizations the biometric system serves one at a time. So, why not shift to an automated attendance system which works on face recognition technique? Be it a class room or entry gates it will mark the attendance of the students, professors, employees, etc.

IV. USING BIOMETRICS

Biometric Identification Systems are widely used for unique identification of humans mainly for verification and identification. Biometrics is used as a form of identity access management and access control. So use of biometrics in the student attendance management system is a secure approach. There are many types of biometric systems like fingerprint recognition, face recognition, voice recognition, iris recognition, palm recognition etc. In this project, we used fac

The Problems with Current System

The problem with this approach in which manually taking and maintaining the attendance record is that it is a very inconvenient task. Traditionally, student attendances are taken manually by using the attendance sheet given by the faculty members in class, which is a time consuming event. Moreover, it is very difficult to verify one by one student in a large classroom environment with distributed branches whether the authenticated students are actually responding or not. The ability to compute the attendance percentage becomes a major task as manual computation produces errors, and also wastes a lot of time. This method could easily allow for impersonation and the attendance sheet could be stolen or lost.It is more costly (price of register, pen and the salary of person taking attendance)

V. PROPOSED SYSTEM

To overcome the problems in the existing attendance system we shall develop a Biometric based attendance system over a simple attendance system. Interactive system over static one Digitized attendance system over file system. There are many solutions to automate the attendance management system like a thumb based system, simple computerized attendance system but all these systems have limitations over work and security point of view. Our proposed system shall be a “Face Recognition Attendance System” which uses the basic idea of image processing which is used in many secure applications like banks, airports etc.

VI. FACE LIBRARY FORMATION PHASE

In this phase, the acquisition and the pre-processing of the face images that are going to be added to the face library are performed. Face images are stored in a face library in the system. We call this face database a "face library" because at the moment, it does not have the properties of a relational database. Every action such as training set or

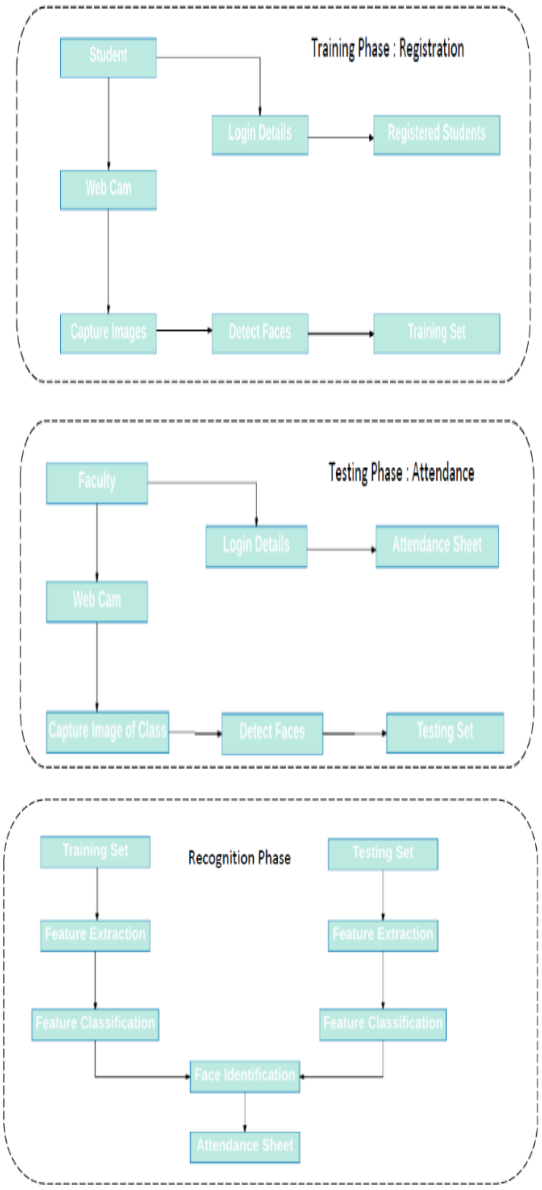
Supervised Machine Learning formation is performed on this face library. Face library is

Initially empty. In order to start the face recognition process, this initially empty face library has to be filled with face images. The proposed face recognition system operates on image files of any resolution. In order to perform image size conversions and enhancements on face images, there exists the "pre-processing" module. This module automatically converts every face image to 200 x 180 (if necessary) and based on user request, it can modify the dynamic range of face images (histogram equalization) in order to improve face recognition performance. After acquisition and pre-processing, the face image under consideration is added to the face library. Each face is represented by two entries in the face library: One entry corresponds to the face image itself (for the sake of speed, no data compression is performed on the face image that is stored in the face library) and the other corresponds to the weight vector associated with that face image. Weight vectors of the face library members are empty until a training set is chosen and Supervised Machine Learning is formed.

VII. TRAINING PHASE

After adding face images to the initially empty face library, the system is ready to perform training sets and Supervised Machine Learning formations. Those face images that are going to be the training set are chosen from the entire face library. Now that the face library entries are normalized, no further pre-processing is necessary at this step. After choosing the training set, Supervised Machine Learning is formed and stored for later use. Supervised Machine Learning is calculated from the training set, keeping only the M images that correspond to the highest eigenvalues. These M Supervised Machine Learning define the M-dimensional "face space". As new faces are experienced, the Supervised Machine Learning can be updated or recalculated. The corresponding distribution in the M-dimensional weight space is calculated for each face library member, by projecting its face image onto the "face space" spanned by the Supervised Machine Learning. Now the corresponding weight vector of each face library member has been updated which were initially empty. The system is now ready for the recognition process. Once a training set has been chosen, it is not possible to add new members to the face library with the conventional method that is presented in "phase 1" because the system does not know whether this item already exists in the face library or not. A library search must be performed.

VIII. SYSTEM ARCHITECTURE



IX. MODULE SPECIFICATION

Face Detection

Face detection is defined as finding the position of the face of an individual. In other words it can be defined as locating the face region in an image. After detecting the face of a human its facial features are extracted and has a wide range of applications like facial expression recognition, face recognition, observation systems, human PC interface and so forth.

Detecting faces in an image of a single person is easy but when we consider a group image of an image containing multiple faces, the task becomes difficult. For the application of face recognition, detection of face is very important and the

first step. After detecting face the face recognition algorithm can only be functional. Face detection itself involves some complexities for example surroundings, postures, enlightenment etc.

The problem of face recognition is all about face detection. This is a fact that seems quite bizarre to new researchers in this area. However, before face recognition is possible, one must be able to reliably find a face and its landmarks. This is essentially a segmentation problem and in practical systems, most of the effort goes into solving this task. In fact the actual recognition based on features extracted from these facial landmarks is only a minor last step.

There are two types of face detection problems:

1) Face detection in images
2) Real-time face detection.

Most face detection systems attempt to extract a fraction of the whole face, thereby eliminating most of the background and other areas of an individual's head such as hair that are not necessary for the face recognition task.

X. FACE DETECTION IN IMAGES

With static images, this is often done by running a 'window' across the image. The face detection system then judges if a face is present inside the window. Unfortunately, with static images there is a very large search space of possible locations of a face in an image. Faces may be large or small and be positioned anywhere from the upper left to the lower right of the image. Most face detection systems use an example based learning approach to decide whether or not a face is present in the window at that given instant. A neural network or some other classifier is trained using supervised learning with 'face' and 'non-face' examples, thereby enabling it to classify an image (window in face detection system) as a 'face' or 'non-face'.

Unfortunately, while it is relatively easy to find face examples, how would one find a representative sample of images which represent non-faces? Therefore, face detection systems using example based learning need thousands of 'face' and 'non-face' images for effective training.

There is another technique for determining whether there is a face inside the face detection system's window - using Template Matching. The difference between a fixed target pattern (face) and the window is computed and threshold. If the window contains a pattern which is close to the target pattern (face) then the window is judged as containing a face. An implementation of template matching called Correlation Templates.

It uses a whole bank of fixed sized templates to detect facial features in an image. By using several templates of different (fixed) sizes, faces of different scales (sizes) are detected. The other implementation of template matching is using a deformable template. Instead of using several fixed size templates, we use a deformable template (which is non-rigid) and thereby change the size of the template hoping to detect a face in an image. A face detection scheme that is related to template matching is image invariants.

Here the fact that the local ordinal structure of brightness distribution of a face remains largely unchanged under different illumination conditions is used to construct a spatial template of the face which closely corresponds to facial features. In other words, the average grey-scale intensities in human faces are used as a basis for face detection. For example, almost always an individual’s eye region is darker than his forehead or nose. Therefore an image will match the template if it satisfies the 'darker than' and 'brighter than’ relationships.

XI. REAL-TIME FACE DETECTION

It involves detection of a face from a series of frames from a video capturing device. While the hardware requirements for such a system are far more stringent, from a computer vision standpoint, real-time face detection is actually a far simpler process than detecting a face in a static image. This is because unlike most of our surrounding environment, people are continually moving. Since in real-time face detection, the system is presented with a series of frames in which to detect a face, by using spatiotemporal filtering (finding the difference between subsequent frames), the area of the frame that has changed can be identified and the individual detected. Furthermore, exact face locations can be easily identified by using a few simple rules, such as,

1) The head is the small blob above a larger blob -the body
2) Head motion must be reasonably slow and contiguous - heads won't jump around erratically.

XII. CONCLUSION

We are currently extending the system to deal with a range of aspects (other than full frontal views) by defining a small number of classes for each known person corresponding to characteristic views. Because of the speed of the recognition, the system has many chances within a few

seconds to respond to attempts to recognize many slightly different views.

In this project we store a set of images in the database, whenever we input an image that we want to test and if it is in the database will be recognized using the Eigenface algorithm and the reconstructed face will be the output image. Here we are not using any filters but we are simply recognizing by reconstructed images of the input. And parallel the Euclidean distances also will be measured.

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