First Progress Report

Abstract/ Synopsis:

Nowadays Educational institutions are concerned about regularity of student attendance. This is mainly due to students' overall academic performance is affected by his or her attendance in the institute. Mainly there are two conventional methods of marking attendance which are calling out the roll call or by taking student sign on paper. They both were more time consuming and difficult. Hence, there is a requirement of 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. We have projected our ideas to implement "Attendance Management System Based on Face 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. Hence, this system can be implemented in a field where attendance plays an important role.

The proposed system uses Haar Cascade machine learning object detection algorithm The algorithm used to identify objects in an image or video based on the concept of features proposed by Paul Viola and Michael Jones. It is a machine learning based approach where a cascade function is trained from a lot of positive and negative images. It is then used to detect objects in other images. The attendance record is maintained in an excel sheet which is updated automatically in the system.

- **Topic of the Project:**

  Attendance System Using Face Recognition

- **Objective/ Scope of the project.**

  The objective of this system is to present an automated system for human face recognition for an organization or institute to mark the attendance of their students. This paper introduces face detection method using the Voila and Jones algorithm and recognition using LBP technique. The system will record the attendance of the students. The above system is fully automated and easily deployable. User gets an authentication to upload the image containing file and also to view the attendance.

- The system should be able to detect students faces in a classroom within 75% accuracy.
- Recognize student stored on a database of faces by matching them to images on a database with an accuracy within 75%.
- The system should be able to match detected students faces cropped from an image to those on a database on the system.
- The system should be able to process an image within 10 minutes to be able to achieve the objective,
- The algorithm implemented for the system's functionality will achieve system accuracy within 75%.
- The positive prediction should be within 75%.
- The system designed will be user friendly with a Graphical User Interphase that will serve as an access to the functionalities of the system.

- **Process Description:**

The proposed system introduces an automated attendance system which integrates a face recognition algorithm. Any device with a camera can capture an image or a video. The received file undergoes face detection and face recognition and on the successful recognition the database is updated with the attendance and a sheet is generated.

This work is being carried out in five stages:

Step 1: Capturing

In this the capturing of the image will be done using a device .

Step 2: Generating Data for Training

Initially the images are saved to the database and they undergo detection and training. Further this data will be used to compare the detected images in all the uploaded files and mark the attendance.

Step 3: Face Detection

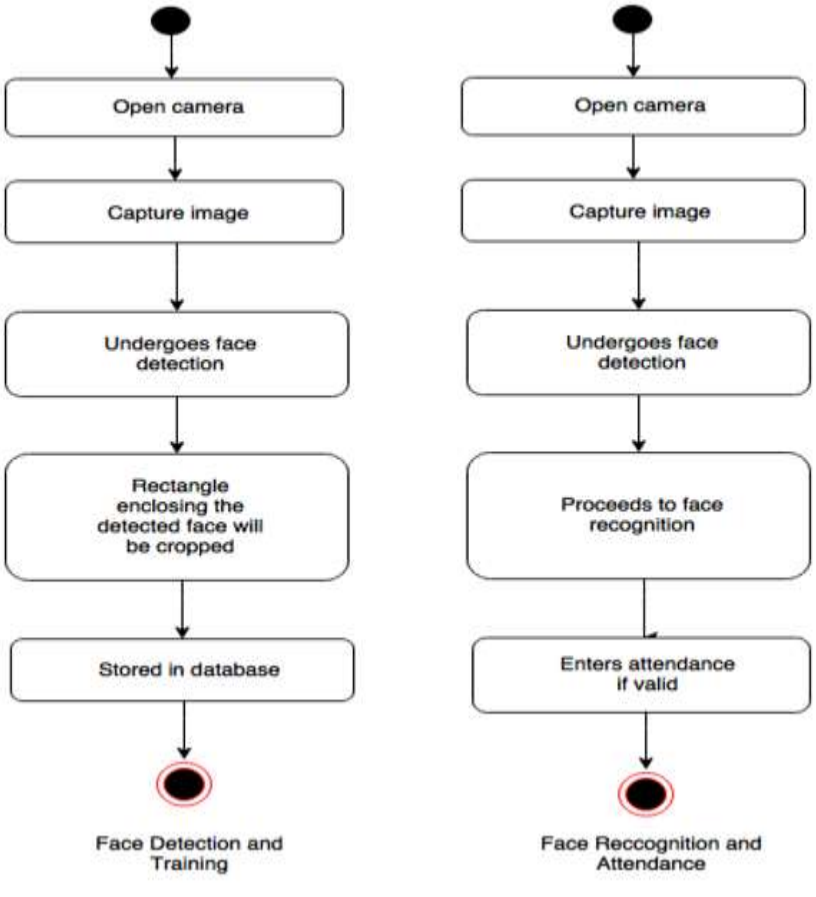
The captured images undergo face detection using Viola and Jones algorithm. The frames received are checked for the faces for further recognition.

Step 4: Face Recognition

The detected images undergo LBP with the trained images of the databases. By this the d etected images are now recognized.

Step 5: Attendance Marking

After the recognition process the students recognized are searched in the database and their attendance is marked.



- **Methodology Adopted**

The agile project delivery framework is the approach that will be used for the development of the system. DSDM is an agile methodology approach primarily used as a software development method. The development of this project is requiring the supervisor (user) involvement in order to have timely visible results. However, as it is an ongoing research area, this project requires incremental implementation in smaller functionalities which will be put together at the end for a complete system. With the help of my supervisor, it is important to consider DSDM as the approach to achieve the project objectives. The project objectives specified in the proposal can only be achieved with the expertise of the supervisor, as functionalities will be prioritised in order of importance alongside continuous user involvement. Unlike other approaches (Waterfall) where the stages of implantations are clearly defined, it was preferable to use the approach which will adapt easily to changes made during the implementation.

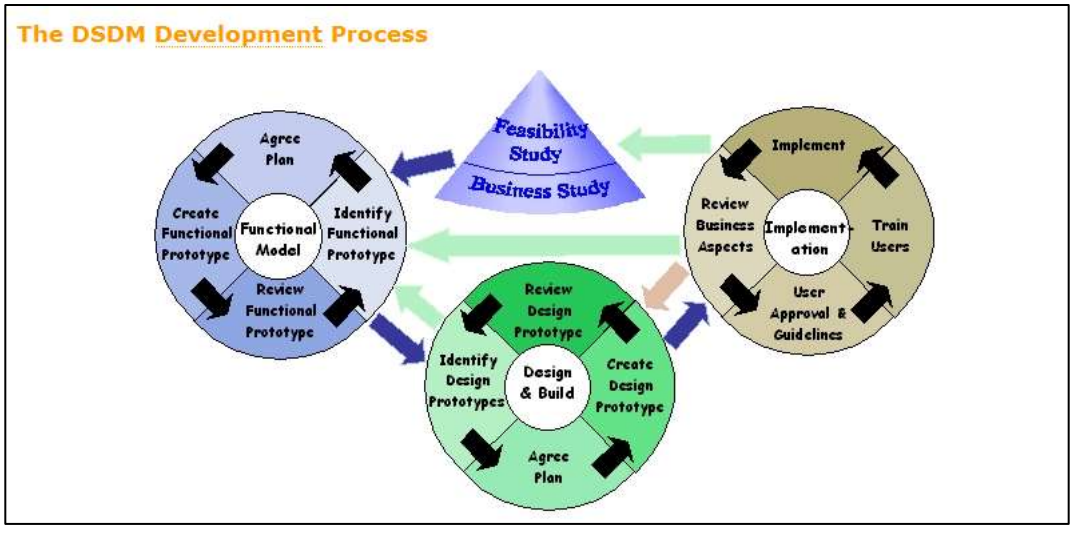


Figure 3.1: DSDM Development Process. (Pierre, H. 2016).

- **Proposed System Architecture**

The System Architecture Consists of basically three layers

1. Application Layer

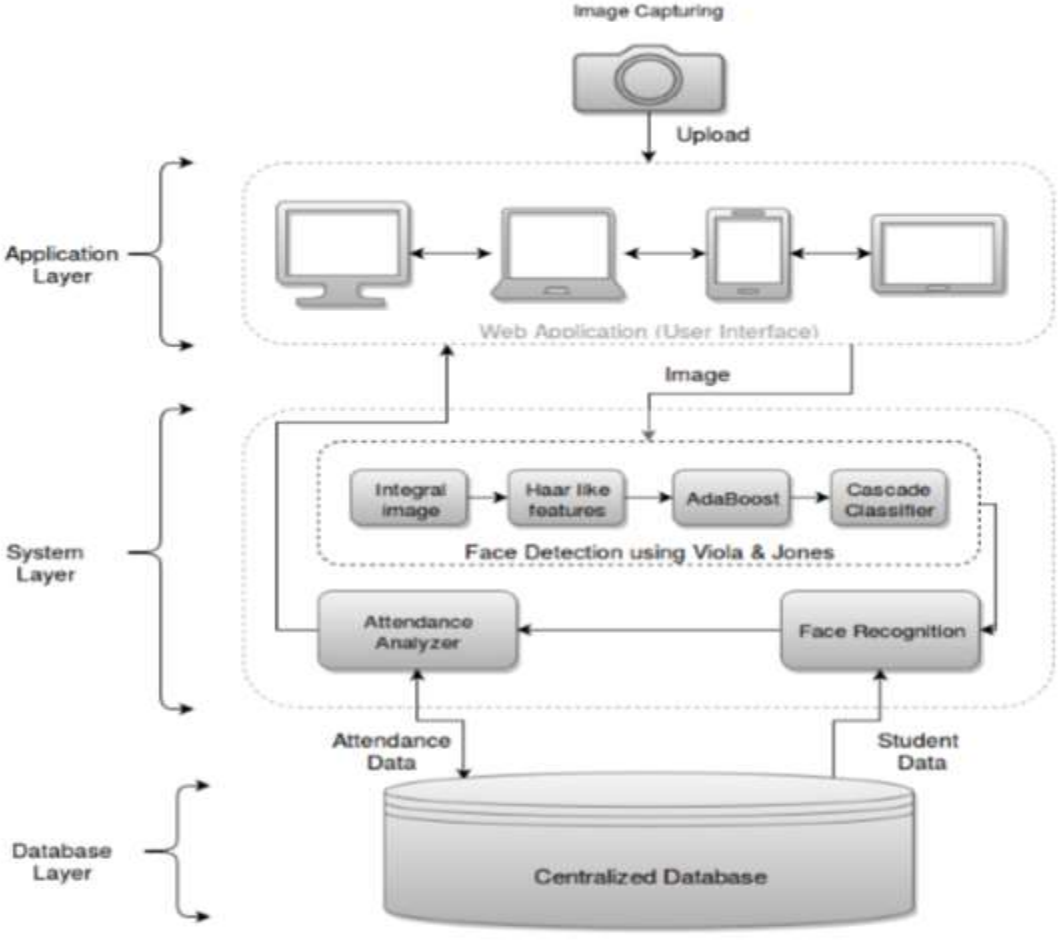
There is the capturing phase in this the user captures the frames and using a web app that runs on almost all platforms upload the file to the server. Authentication is provided to the users. This web app is used to upload captured frames as well as to view the attendance.

2. System Layer

This is the layer where the processing is done that is the detection and recognition part at the server side. Viola and Jones algorithm is used to detect images from the frames.

3. Database Layer

The Database layer is a centralized data base system which consists of student data base and their attendance. The student database is formed by initial feeding of the frames from which system detects faces crops them and stores it to the database and these stored images are hence forth used for the recognition part.



- **Resources**

To be used efficiently, all computer software needs certain hardware components or other software resources to be present on a computer. These prerequisites are known as (computer) system requirements and are often used as a guideline as opposed to an absolute rule. Most software defines two sets of system requirements: minimum and recommended.

- **Platform Requirement**

  The supported operating systems for client include :

  • Windows 7/8/10

- **Software requirements** deal with defining software Resource requirements and prerequisites that need to be installed on a computer to provide optimal functioning of an application. These requirements or prerequisites are generally not included in the software installation package and need to be installed separately before the software is installed.

  1. OpenCV 4.1.0
  2. python 3.7.3
  3. pycharm-community-anaconda-2019.1.3

- **Hardware Requirement**

  The most common set of requirements defined by any operating system or software application is the physical computer resources, also known as hardware, A hardware requirements list is often accompanied by a hardware compatibility list (HCL), especially in case of operating systems. An HCL lists tested, compatible, and sometimes incompatible hardware devices for a particular operating system or application.

Component	Minimum	Recommended
Processor	1.8 Ghz Dual Core Intel Pentium/AMD Athlon 64 X2	Intel Core i3-2100 2nd Generation
RAM	2 GB	4 GB
Camera	8 Mega-Pixel	16 Mega-Pixel DSLR
Disk	128 GB	512 GB

- **Literature Survey:**
  - **Automated Attendance System Using Face Recognition ThroughVideoSurveillance**

The objective of this system is to present an automated system for human face recognition in a real time background for an organization to mark the attendance of their employees or student. The work carried out describes an automated attendance system using video surveillance. The proposed algorithm is automatic and efficient in intelligent surveillance applications. Vide-o surveillance is used to detect the object movement thereby the captured image undergoes face detection and recognition process and searches the student database and enters the attendance if it is valid in the list[1].

Proposed Algorithms

This paper uses Viola and Jones algorithm for face detection and correlations formulas for face recognition. Viola and Jones algorithm is used for face detection. Where it is used in both creating database and face recognition process. Where in case creating database it takes input image through a web camera continuously. Captured image undergoes face detection. Detected face will be cropped and stored in database.

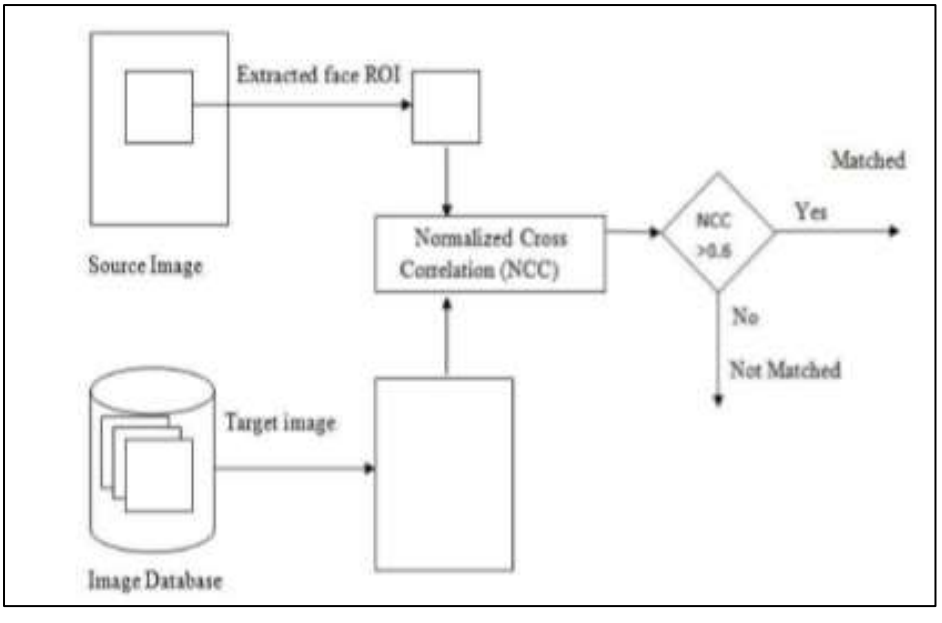


Figure 2.1: Stages of Face Recognition Algorithm

Weaknesses

• In Viola and Jones the result depends on the data and weak classifiers. The quality of the final detection depends highly on the consistence of the training set. Both the size of the sets and the interclass variability are important factors to take in account.

• The System overview does not provide the clear idea about components of the overall process.

• The analysis shows very bad results when in case of multiple person with different sequence.

How to Overcome

• The training of the data should be done in correct manner so that the quality final detection will increase.

• System overview should contain the overall architecture that will give the clear and comprehensive information of the project[4]

- **Study of Implementing Automated Attendance System Using FaceRecognition**

Human face recognition is an important branch of biometric verification and has been widely us ed in many applications, such as video monitor system, human-computer interaction, and door control system and network security. This paper describes a method for Student's Attendance System which will integrate with the face recognition technology using Personal Component Analysis (PCA) algorithm. The system will record the attendance of the students in class room environment automatically and it will provide the facilities to the faculty to access the information of the students easily by maintaining a log for clock-in and clock-out time[2].

ProposedAlgorithms

This paper is uses PCA(Principle Component Analysis) technique for face recognition and image compression. The implementation of this project is done using OpenCV libraries for face detection and further processes. PCA method has been widely used in applications such as face recognition and image compression. PCA is a common technique for finding patterns in data, and expressing the data as eigenvector to highlight the similarities and differences between different data.

Then the system implementation is divided in three major part Face Detection and Extract, Learn and Train Face Images, Recognise and Identification. Implementation is done using OpenCV libraries which is open source and cross platform.

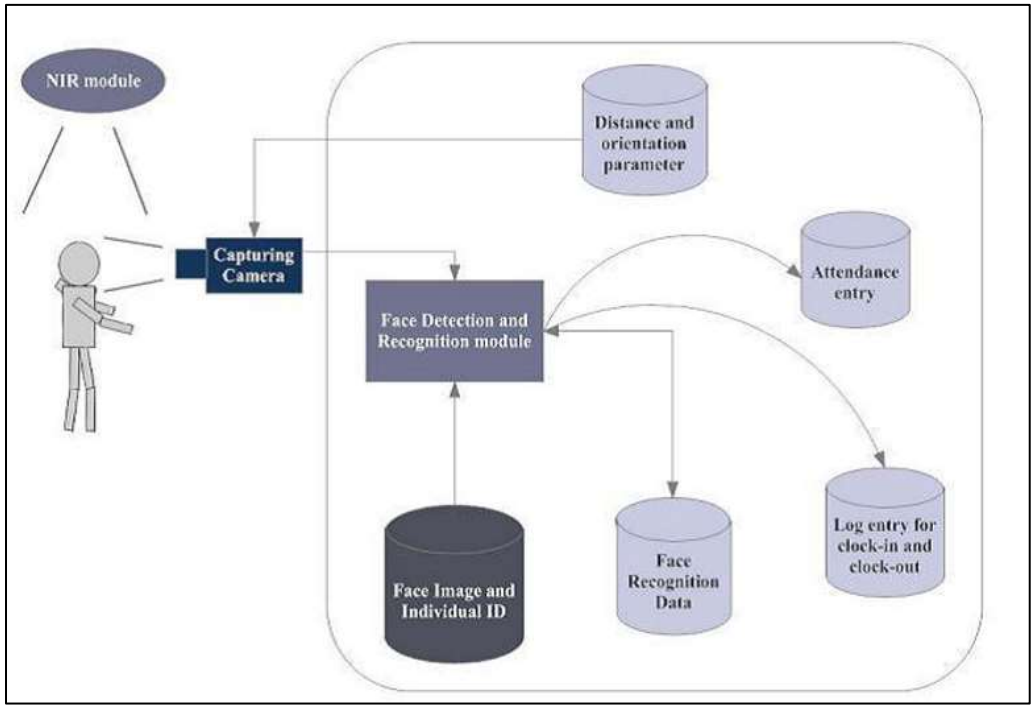


Figure 2.2: PCA technique

Weaknesses

This paper uses PCA which have two major disadvantages.

•The covariance matrix is difficult to be evaluated in an accurate manner • Even the simplest invariance could not be captured by the PCA unless the training data explicitly provides this information

This paper is not giving the clear idea about face detection and recognition algorithm. Author explains the code of OpenCV instead of explaining the techniques and methods.

How to Overcome

• The training data should provide the information explicitly.

• Author should explain working of the algorithm which he/she going to use instead of explaining the functions of OpenCv libraries[5].

- **Domain Knowledge :**

  Education in its broadest, general sense is the means through which the aims and habits of a group of people lives on from one generation to the next. Generally, it occurs through any experience that has a formative effect on the way one thinks, feels, or acts. In its narrow, technical sense, education is the formal process by which society deliberately transmits its accumulated knowledge, skills, customs and values from one generation to another, e.g., instruction in schools.

  Education sector employs an enormous amount of graduates. It covers the three main areas of school, further and higher education, as well as education that take place in non-school or college settings. The main area of work is teaching and lecturing, but there are other roles, particularly in education advice and development. Local authorities are the largest employers in this sector, but there are also a large number of independent schools, as well as colleges and universities. A teaching degree/formal education is a requirement for most jobs in this sector, but there are some opportunities to teach without this, for example teaching English as a foreign language.