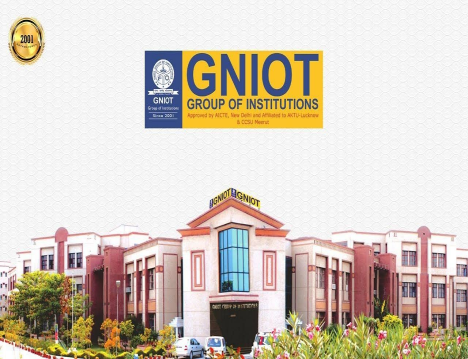
**Greater Noida Institute Of Technology**

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**Department of Information Technology**

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**Final Year Project Synopsis**

**FACE RECOGNITION BASED ATTENDANCE SYSTEM**

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**Abstract**

Automatic face recognition (AFR) 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 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 (6). 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 enrols 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.

**Introduction**

Maintaining the attendance is very important in all the institutes for checking the  performance of employees (4). Every institute has its own method in this regard. Some are  taking attendance manually using the old paper or file based approach and some have adopted  methods of automatic attendance using some biometric techniques. But in these methods  employees have to wait for long time in making a queue at time they enter the office. Many  biometric systems are available but the key authentications are same is all the techniques.  Every biometric system consists of enrolment process in which unique features of a person is  stored in the database and then there are processes of identification and verification. These  two processes compare the biometric feature of a person with previously stored template  captured at the time of enrollment. Biometric templates can be of many types like  Fingerprints, Eye Iris, Face, Hand Geometry, Signature, Gait and voice. Our system uses the  face recognition approach for the automatic attendance of employees in the office room  environment without employees’ intervention (2). Face recognition consists of two steps, in  first step faces are detected in the image and then these detected faces are compared with the  database for verification. A number of methods have been proposed for face detection i.e. Ada Boost algorithm, the Float Boost algorithm, the S-Ada Boost algorithm Support Vector  Machines (SVM), and the Bayes classifier. The efficiency of face recognition algorithm can  be increased with the fast face detection algorithm. In all the above methods SURF is most  efficient. Our system utilized this algorithm for the detection of faces in the office room image. Face recognition techniques can be Divided into two types Appearance based which  use texture features that is applied to whole face or some specific Regions, other is Feature based which uses geometric features like mouth, nose, eyes, eye brows, cheeks and Relation  between them. Statistical tools such as Linear Discriminant Analysis (LDA), Principal  Component Analysis (PCA), Kernel Methods, and Neural Networks, Eigen-faces have been  used for construction of face templates. Illumination invariant algorithm is utilized for  removing the lighting effect inside the office room.

**Objectives**

The objectives of the project are given below:

1. Detection of unique face image amidst the other natural components such as walls, backgrounds etc.

2. Extraction of unique characteristic features of a face useful for face recognition.

3. Detection of faces amongst other face characters such as beard, spectacles etc.

4. Effective recognition of unique faces in a crowd(individual recognition in crowd).

5. Automated update in the database without human intervention.

**Methodology**

The proposed system is designed for automating the attendance of the different organization and reduces the flaws of existing manual system. The system calculate the attendance subject wise, that is the data of students and subjects are added manually by administrator, and whenever time for corresponding subject arrives the system automatically starts taking snaps and find whether human faces are appear in the given image or not. We have used Histogram of Oriented Gradient for face detection and deep learning techniques to calculate and compare 128-d face features for face recognition. Once faces are detected and recognize with the existing database, system calculate attendance for the recognize students with the respective subject id in real time. And an excel sheet generated and saved by the system automatically. Our system splits into two parts, First the front end side which consist of GUI which is based on Electron JS that is JavaScript stack which is serving as a client and the second is the backend side which consist of logic and based on Python which is serving as a server. And we know that both the languages cannot communicate with each other directly so we have used IPC (Inter Personal Communication) techniques with zero library as a bridge to communicate these two languahave used IPC (Inter Personal Communication)techniques with zero library as a bridge to communicate these two languages. The Electron JS call the python functions and interchange data via TCP with help of Zero PC Library.

**3.1 Data Acquisition**

**3.1.1 Image acquisition:**

Image is acquire using a high definition camera which is placed in the classroom. This image is given as an input to the system.

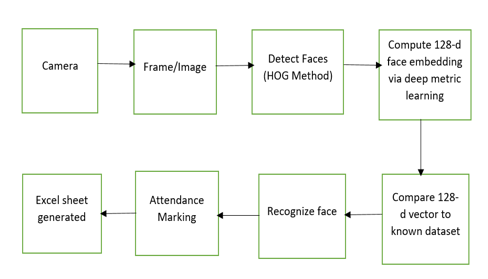
**3.1.2 Dataset Creation:**

Dataset of students is created before the recognition process. Dataset was created only to train this system. We have created a dataset of 5 students which involves their name, roll number, department and images of student in different poses and variations. For better accuracy minimum 15 images of each students should be captured. Whenever we register student’s data and images in our system to create dataset, deep learning applies to each face to compute 128-d facial features and store in student face data file to recall that face in recognition process. This process is applies to each image taken during registration.

**3.1.3 Storing:**

We have used JSON to store the student’s data. **JavaScript Object Notation (JSON):** To represent a structured data based on JavaScript object syntax, a standard text based format is introduced. JSON is used for transmitting data in web application. It is a perfect solution for storing temporary data that’s consumed by the entity that’s creates the data. JSON can store data in String, Number, Object, Array, Boolean, Null form which means it has limitation of storing data in functions, dates and undefined data form. If you are trying to store or exchange data in functions or dates than JSON is not right choice for you.

Face recognition process

 **Figure 2.** Block Diagram

**3.2.1 Face Detection and Extraction:**

Face detection is important as the image taken through the camera given to the system, face detection algorithm applies to identify the human faces in that image, the number of image processing algorithms are introduce to detect faces in an images and also the location of that detected faces. We have used HOG method to detect human faces in given image.

**3.2.2 Face Positioning:**

There are 68 specific points in a human face. In other words we can say 68 face landmarks. The main function of this step is to detect landmarks of faces and to position the image. A python script is used to automatically detect the face landmarks and to position the face as much as possible without distorting the image.

**3.2.3 Face Encoding:**

Once the faces are detected in the given image, the next step is to extract the unique identifying facial feature for each image. Basically whenever we get localization of face, the 128 key facial point are extracted for each image given input which are highly accurate and these 128d facial points are stored in data file for face recognition.

**3.2.4 Face matching:**

This is last step of face recognition process. We have used the one of the best learning technique that is deep metric learning which is highly accurate and capable of outputting real value feature vector. Our system ratifies the faces, constructing the 128- d embedding (ratification) for each. Internally compare\_faces function is used to compute the Euclidean distance between face in image and all faces in the dataset. If the current image is matched with the 60% threshold with the existing dataset, it will move to attendance marking.

3.3 Attendance Marking

Once the face is identify with the image stored in JSON file, python generate roll numbers of present students and return that, when data is returned, the system generates attendance table which includes the name, roll number, date, day and time with corresponding subject id. And then passes the data to python to store the table into an excel sheet automatically. Each sheet is saved according to the subjects which already entered by the administrator, for example when system generates excel sheet by sending the compiled sheet in an array to python, the python first checks whether there exit any excel sheet of that date, if yes then it create separate worksheet by subject id, so that attendance is differentiated for different subjects.

**Results**

Smart Attendance Management System is simple and works efficiency. The system works automatically once the registration of individual student created by the administration.

This is front page of our attendance system. Which is based on HTML5, CSS3 & JS. It consist of the following

modules,

• Student Registration

• Face Recognition

• Addition of subject with their corresponding time.

• Attendance sheet generation and import to Excel

(xlsx) format.

To initialize this system, the administrator first register their student data along with their name roll number and department. We have created a training dataset of 6 students (total of 120 images for each) for testing purpose. This is the subject folder, subjects are to be filled according to time table once the time arrives for the corresponding subject, the system starts capturing images, detects the faces, compares the faces with existing database, mark attendance and generate excel sheet for the recognize students.

**Tools & Technologies**

Front End:

* HTML5
* CSS3
* JS
* JSON

Backend:

* Deep Learning
* Python
* Image Processing
* Face Recognition
* Histogram of Oriented Gradients(H.O.G)

Database:

* MySql