

INDUSTRIAL TRAINING SEMINAR

REPORT ON

FACE ATTENDANCE SYSTEM

In the partial fulfillment for the degree of B.Tech.



JIET Institute of Engineering and Technology
Department of Computer Science and Engineering
Session 2023-24

Submitted To:

Mrs. Sunita Godara
Associate Professor

Submitted By:

Aman Kumar Sharma
IIIrd year, Vth sem, A1

Acknowledgment

I would like to express my sincere gratitude and regards to my training supervisor **Mrs.Raksha Shetty** and my Mentor **Mrs.Arshi Riyaz**, Assistant Professor(CSE) for theire constant inspiration, supervision and invaluable guidance while performing the project. My effort would not have fetched even a clinch to any result without the valuable help guidance of my respectable teachers whose inputs and suggestions helped me to develop application, satisfying the necessary requirements.

Name : Aman Kumar Sharma

Year/Sem/Batch : IIIrd/Vth/A1

Date : 02-10-2023

CERTIFICATE FROM THE COMPANY



Figure 1: Completion Certificate

Contents

Acknowledgment	2
CERTIFICATE FROM THE COMPANY	3
1 Introduction	1
1.1 What I Learn during Training?	1
1.2 Projects Developed Based on Training Knowledge and Mentor Guidance:	2
1.2.1 Student Data Project:	2
1.2.2 Phishing Domain Detection:	3
1.2.3 Face Attendance System:	3
2 COMPANY/ORGANIZATION OVERVIEW	4
2.1 Company/Organization Technology area	4
2.2 Details about the training guide/mentor at the company/organization.	5
2.3 Address/ Contact Information of the Company/ Organization and Guide	7
3 TECHNOLOGY'S LEARNT DURING TRAINING/INTERNSHIP	8
3.1 Python programming:	8
3.1.1 Basics of Python and use of Jupyter Notebook.	8
3.1.2 Python Data type, Python Loops and functions.	9
3.1.3 Use of the NumPy Python module and its various functions .	10
3.1.4 Use of the Pandas module for dataset visualization.	11
3.2 Machine learning algorithms	11

CONTENTS	5
3.3 Introduction of AI	13
3.4 Deployment of Machine Learning Models	14
4 TECHNICAL DETAILS OF PROJECT/STUDY	15
4.1 Objective	15
4.2 Problem Statement	15
4.2.1 EXISTING RECOGNITION SYSTEMS:	16
4.2.2 PROPOSED SYSTEM AND SOLUTION:	16
4.3 Relevance of the Project	16
4.4 Scope of the project	17
4.5 Functional Block Diagram	18
4.6 Functions/Modules Details	18
5 LITERATURE SURVEY	19
5.1 Implementation of classroom attendance system based on face recognition in class	19
5.2 Face Recognition-based Lecture Attendance System	20
5.3 Study of Implementing Automated Attendance System Using Face Recognition Technique	21
5.4 Face Recognition Based Attendance Marking System	22
5.5 Attendance Management System Using Face Recognition	22
6 SYSTEM REQUIREMENTS SPECIFICATION	23
6.1 Hardware Requirements	23
6.2 Software Requirements	23
6.3 Functional Requirements	24
7 SYSTEM ANALYSIS AND DESIGN	25
7.1 Viola Jones Algorithm	25
7.2 Proposed System	27

<i>CONTENTS</i>	6
8 IMPLEMENTATION	28
8.1 Code:	28
8.1.1 AutoEncoding.py	28
8.2 Flowchart	30
9 RESULTS	31
10 CONCLUSION	33
11 REFERENCES	34

List of Figures

1	Completion Certificate	3
4.1	Functional Block Diagram	18
7.1	- Viola Jones algorithm	25
7.2	- Sum of Pixels	26
7.3	- Different Types of Features	26
8.1	- Flowchart	30
9.1	- output1	31
9.2	- output2	32
9.3	- output3	32

Chapter 1

Introduction

1.1 What I Learn during Training?

This Report Summarizes about my 45 days training in the field of Data Science with AI & ML. In this 45 days training I have learned about the following things:

- **Learn Python:** We have learned Python programming from basic to advanced levels because Python is widely used in machine learning. All machine learning is written in Python, and Python has numerous libraries that help us work with machine learning and also aid in our learning process.
- **Machine Learning Fundamentals:** During the training, we delved into various machine learning algorithms, such as linear regression, logistic regression, K-Nearest Neighbors (KNN), and more. These algorithms serve as fundamental tools in predictive modeling, classification, and clustering tasks within the field of machine learning.
- **Introduction to AI:** Throughout the training, we covered the fundamentals of Artificial Intelligence (AI) and gained an introductory understanding of neural networks. Additionally, we explored how computers handle natural language processing, a crucial aspect of AI that enables machines to understand, inter-

pret, and respond to human language. These topics provided a foundational insight into the breadth and potential applications of AI technologies.

- **Deployment of Models:** Our training included an exploration of Flask, a web framework in Python. With Flask, we learned the streamlined process of deploying machine learning models. This knowledge equipped us with the skills to easily and efficiently deploy our trained machine learning models, enabling us to make our AI solutions accessible and operational within web-based environments.

1.2 Projects Developed Based on Training Knowledge and Mentor Guidance:

I have completed several projects leveraging the knowledge acquired during my training, with invaluable guidance from my supervisors and mentors. These projects encompass a range of both minor and major initiatives that apply my skills. They showcase my practical understanding of various concepts in the field of Data Science, AI, and ML.

1.2.1 Student Data Project:

This is the first minor project I created during my training. The project aims to manage student data and includes five primary functions:

- a. Accept Student
- b. Display Students
- c. Search Student

more (https://github.com/amansetu03/student_data_project)

1.2.2 Phishing Domain Detection:

This is the first major project I developed. In this project, we take any URL and, based on the features extracted from the URL, predict whether it is a safe or a potentially fraudulent phishing domain.

more(<https://github.com/amansetu03/Phishing-Domain-Detection>)

1.2.3 Face Attendance System:

This is the second major project I developed during training. A face attendance system is a cool way to keep track of who's at a place without using any cards or papers. It works by looking at your face and remembering who you are. When you stand in front of a special camera, it marks that you're there. It uses different techniques like converting the image to black and white and finding specific parts like the eyes to recognize the student.

more(<https://github.com/amansetu03/Face-Attendance-System>)

Chapter 2

COMPANY/ORGANIZATION OVERVIEW

This chapter provides an overview of the company where I underwent training during the summer industrial training period and completed all the projects. It aims to highlight the company's key attributes, the specific technology area, details about the training guide/mentor, and the address/contact information of the company/organization and guide.

The place where I completed my 45-day training was a company named **TechieNest Pvt. Ltd.**, located in Jaipur. This company provided the training where we acquired knowledge in the field of **Data Science with AI&ML**. With the assistance of our mentor, we were able to learn efficiently and effectively.

2.1 Company/Organization Technology area

TechieNest, a certified ISO 9001:2008 technology service provider and training organization, specializes in a diverse range of technological domains. The company's core focus areas and expertise revolve around:

- Data Science
- Python
- Machine Learning
- Artificial Intelligence
- Computer Vision
- Deep Learning
- Data Engineering
- DevOps Automation
- Automation
- Embedded Systems
- Internet of Things (IOT)
- Big Data
- Natural Language Processing

These specialties exemplify TechieNest's commitment to various advanced technological fields, offering comprehensive training and services. The company's dedication to these areas reflects their mission to stay at the forefront of technological advancements and offer practical, innovative education in these domains.

2.2 Details about the training guide/mentor at the company/organization.

Our mentor, provided by the company, was **Ms. Raksha Shetty**. She has excelled in the fields of Machine Learning and Data Science. Through her effective teaching

methods, we were able to gain a clear understanding of Python and various Machine Learning algorithms. Ms. Shetty was instrumental in assisting us with our projects. It was through her guidance that we were able to develop applications and gain a solid grasp of our concepts.

TechieNest is a dynamic and innovative company based in Jaipur. It specializes in providing cutting-edge solutions in the realm of technology. With a keen focus on leveraging the latest advancements in Software Development, Data Analytics, and Artificial Intelligence, TechieNest delivers tailor-made solutions to meet the diverse needs of its clients.

Whether it's developing robust software applications, harnessing the power of data to drive insights and decision-making, or implementing intelligent automation systems, TechieNest excels in delivering exceptional results. The company is also known for its commitment to continuous learning and development, providing comprehensive training programs and mentorship to its employees. This ensures that the team stays updated with the latest technological trends and is equipped with the necessary skills to excel in their respective roles.

Additional information about **Mrs. Raksha Shetty**:

- **Mrs. Raksha Shetty** has extensive experience in the machine learning and data science industries.
- She possesses a deep understanding of various machine learning algorithms and techniques.
- She is a skilled communicator who can effectively explain complex concepts in a clear and concise manner.
- She is passionate about helping students succeed and is committed to providing

them with the support and guidance they need to achieve their goals.

In conclusion, **TechieNest** fosters a collaborative work environment, encouraging team members to share ideas and learn from each other. This culture of collaboration and continuous learning is one of the many reasons why TechieNest is a leader in the tech industry.

2.3 Address/ Contact Information of the Company/ Organization and Guide

Company/Organization Name: TechieNest PVt. Ltd.

Address: Plot No. 262, Muktanand Nagar, Gopalpura Mode, Jaipur, Rajasthan 302018

Phone: +91 92510 94002

Email: info@techienest.in

Website: techienest.in

Guide's Name: Mrs. Raksha Shetty

Position: Data Engineer

Email: rakshasetty004@gmail.com

Phone: +91 91088 18285

Chapter 3

TECHNOLOGY'S LEARN DURING TRAINING/INTERNSHIP

During the training, I have learned the following things:

1. Python programming.
2. Machine learning algorithms.
3. Introduction of AI.
4. Deployment of machine learning models.

3.1 Python programming:

3.1.1 Basics of Python and use of Jupyter Notebook.

Python is a popular programming language. It was created by Guido van Rossum, and released in 1991.

It is used for:

- Machine Learning

- web development (server-side)
- software development
- mathematics
- system scripting

Jupyter Notebook: Jupyter Notebook is an open-source web application that allows creation and sharing of documents containing live code, equations, visualizations, and narrative text. Here's how to use it:

3.1.2 Python Data type, Python Loops and functions.

Python has a variety of data types that can be used to store different types of data. Some of the most common data types include:

- a. **Numbers:** Numbers can be integers, floating-point numbers, or complex numbers.
- b. **Strings:** Strings are sequences of characters.
- c. **Lists:** Lists are ordered collections of objects.
- d. **Tuples:** Tuples are immutable ordered collections of objects.
- e. **Sets:** Sets are unordered collections of unique objects.
- f. **Dictionaries:** Dictionaries are mappings of keys to values.

Python Loops Loops allow you to repeat a block of code until a certain condition is met. The two most common loop types in Python are the for loop and the while loop.

For loops are used to iterate over a sequence of objects. The for loop syntax is as follows:

```
for variable in sequence:  
    code block
```

While loops are used to repeat a block of code while a certain condition is met. The while loop syntax is as follows:

```
while condition:  
    code block
```

Use code with caution. Learn more The while loop will execute the code block as long as the condition is met.

Python Functions

Functions allow you to group together related code and reuse it throughout your program. To define a function, you use the def keyword. The def keyword syntax is as follows:

```
def function_name(parameters):  
    code block
```

3.1.3 Use of the NumPy Python module and its various functions

NumPy is a Python library that provides support for large, multi-dimensional arrays and matrices, along with a large collection of high-level mathematical functions to operate on these arrays and matrices. NumPy is widely used in scientific computing, data science, and machine learning.

Another benefit of using NumPy is that it provides a wide variety of mathematical functions that can be used to operate on arrays and matrices. These functions include:

- Arithmetic operations: addition, subtraction, multiplication, division, etc.
- Linear algebra operations: matrix multiplication, inverse, transpose, etc.
- Statistical functions: mean, median, standard deviation, etc.
- Fourier transform functions: FFT, IFFT, etc.

3.1.4 Use of the Pandas module for dataset visualization.

Pandas: Pandas is an open-source library in Python that is mainly used for working with relational or labeled data both easily and intuitively. It provides various data structures and operations for manipulating numerical data and time series. Pandas is fast and it has high performance & productivity for users.

Dataset Visualization with Pandas: Pandas provides several different options for visualizing your data with .plot(). Even if you're at the beginning of your pandas journey, you'll soon be creating basic plots that will yield valuable insights into your data

for example

```
df.plot.area(alpha=0.4)
```

it will show area chart or area graph displays quantitative data. It is based on the line chart

3.2 Machine learning algorithms

Machine learning (ML) is a field of computer science that gives computers the ability to learn without being explicitly programmed. In other words, ML algorithms are able to improve their performance over time by learning from data.

ML algorithms are used in a wide variety of applications, including:

- **Classification:** Classifying data into different categories, such as spam or not spam.
- **Regression:** Predicting continuous values, such as the price of a house.
- **Clustering:** Grouping similar data points together, such as customers with similar interests.
- **Natural language processing:** Understanding and generating human language, such as machine translation.

- **Computer vision:** Understanding and interpreting images and videos, such as object detection and facial recognition.

There are many different types of ML algorithms, each with its own strengths and weaknesses. Some of the most common ML algorithms include:

- **Linear regression:** A simple algorithm for predicting continuous values.
- **Logistic regression:** A simple algorithm for classification tasks.
- **Decision trees:** A powerful algorithm for both classification and regression tasks.
- **Random forests:** An ensemble algorithm that combines multiple decision trees to improve performance.
- **Support vector machines:** A powerful algorithm for classification tasks.
- **Neural networks:** A class of algorithms that are inspired by the human brain. Neural networks can be used for a wide variety of tasks, including classification, regression, and natural language processing.

How machine learning algorithms work

ML algorithms typically work by first being trained on a set of data. This training data should be representative of the data that the algorithm will be used on in the real world.

Once the algorithm has been trained, it can be used to make predictions on new data. The algorithm will use its knowledge of the training data to make the best possible prediction for the new data.

ML algorithms are constantly learning and improving. As the algorithm is exposed to more data, it will become more accurate in its predictions.

Benefits of machine learning

ML has a number of benefits, including:

- **Accuracy:** ML algorithms can be very accurate, especially when they are trained on large amounts of data.
- **Scalability:** ML algorithms can be scaled to handle large amounts of data.
- **Automation:** ML algorithms can automate many tasks that would otherwise be performed by humans.
- **Insights:** ML algorithms can help us to gain insights from data that we would not be able to see otherwise.

Challenges of machine learning

ML also has some challenges, including:

Data requirements: ML algorithms typically require large amounts of data to train effectively.

- **Overfitting:** ML algorithms can overfit the training data, which means that they may not generalize well to new data.
- **Interpretability:** It can be difficult to interpret how ML algorithms make their predictions.
- **Bias:** ML algorithms can be biased, which means that they may make predictions that are unfair or inaccurate for certain groups of people.

3.3 Introduction of AI

Artificial intelligence (AI) is the ability of machines to think and learn like humans. AI systems can be trained on data to perform tasks such as recognizing objects, translating languages, and making predictions.

AI is already being used in many different ways, such as:

- Self-driving cars use AI to navigate the road and avoid obstacles.

- Virtual assistants like Siri and Alexa use AI to understand your requests and respond appropriately.
- Social media platforms use AI to recommend content that you are likely to be interested in.
- Online retailers use AI to recommend products that you are likely to buy.
- Financial institutions use AI to detect fraud and protect their customers.

AI is still under development, but it has the potential to revolutionize many aspects of our lives. In the future, AI could be used to develop new products and services, improve our healthcare, and make our lives easier and more efficient.

AI is a powerful tool that can be used to solve many different problems. However, it is important to use AI responsibly and ethically. We need to make sure that AI systems are designed to benefit all of society, not just a select few.

3.4 Deployment of Machine Learning Models

We use the Python module, Flask, to deploy machine learning models on the web. Flask is a lightweight web server gateway interface (WSGI) web application framework that provides tools, libraries, and technologies to build web applications. It allows us to wrap our machine learning models into a web application that can be served as an API.

This API can then be consumed in various ways, including integration into mobile app development. This makes our machine learning models accessible across multiple platforms, enhancing their usability and reach.

Moreover, Flask provides options to include user authentication and multiple request methods, which makes it a robust choice for deploying machine learning models. It also supports secure cookies to establish client-side sessions for better security and customization.

Chapter 4

TECHNICAL DETAILS OF PROJECT/STUDY

The aim of this chapter is to provide a technical overview of my project, titled "Face Attendance System". This system leverages the power of facial recognition technology to automate the process of attendance tracking.

4.1 Objective

This project aims to create an attendance system using facial recognition technology. The goal is to move away from the challenges posed by manual and traditional methods of taking attendance

4.2 Problem Statement

The goal of this project is to build, update and maintain an Attendance recording subsystem using facial contours as the biometric key.

4.2.1 EXISTING RECOGNITION SYSTEMS:

- **Fingerprint-Based Recognition System:** This system involves using a portable device that reads a student's fingerprint. Beforehand, the student's fingerprint needs to be stored in the device for it to work. When the student places their finger on the device, it recognizes their fingerprint to mark their attendance.
- **Iris-Based Recognition System:** In this system, students need to stand in front of a camera. The camera scans their iris (the colored part of the eye) to identify and record their attendance. It works when the student's eye is recognized by the camera.
- **Face Based Recognition System:** A Face Based Recognition System uses facial recognition technology to mark attendance. It works by using a high-resolution digital camera to detect and recognize the faces of the students

4.2.2 PROPOSED SYSTEM AND SOLUTION:

The proposed system aims to take pictures of each student's face and save them in a database for attendance purposes. These pictures capture all the unique features of the student's face for comparison with existing records. The system's main working principle involves converting captured video data into images for detection and recognition. If the recognized image matches a student, their attendance is marked. Otherwise, the system marks the database indicating the student as absent.

4.3 Relevance of the Project

A face attendance system is a cool way to keep track of who's at a place without using any cards or papers. It works by looking at your face and remembering who you are. When you stand in front of a special camera, it marks that you're there. It uses different techniques like converting the image to black and white and finding

specific parts like the eyes to recognize the student.

The system is easy to use for everyone, like kids at school or people working in offices. It's like something from a movie about the future, making attendance a breeze and helping to keep things organized.

This method makes attendance-taking really easy and doesn't need any manual work from the students or the teacher. It's like a high-tech way of saying 'I'm here' without needing to sign a paper or use a card. It helps keep everything organized and ensures that attendance is taken accurately.

4.4 Scope of the project

- Using this system we will be able to accomplish the task of marking the attendance in the classroom automatically and output is obtained in an excel sheet as desired from real-time database.
- Designing an efficient algorithm that works well regardless of varying lighting conditions in classrooms.
- Also a camera of the optimum resolution has to be utilised in the system.
- Creating an online database for attendance records and enabling automatic updates to this database.

Overall, the project aims to create a system that takes attendance automatically, provides outputs in real-time, functions robustly under different lighting conditions, employs high-quality cameras, and facilitates an online attendance database with automated updates.

4.5 Functional Block Diagram

Above Block diagram show the working of system means first it take input image through camera then image is converted into gray scale then face detection algorithm detect the face from database if face found then it simply update the attendance count other wise it show that face is unknown.

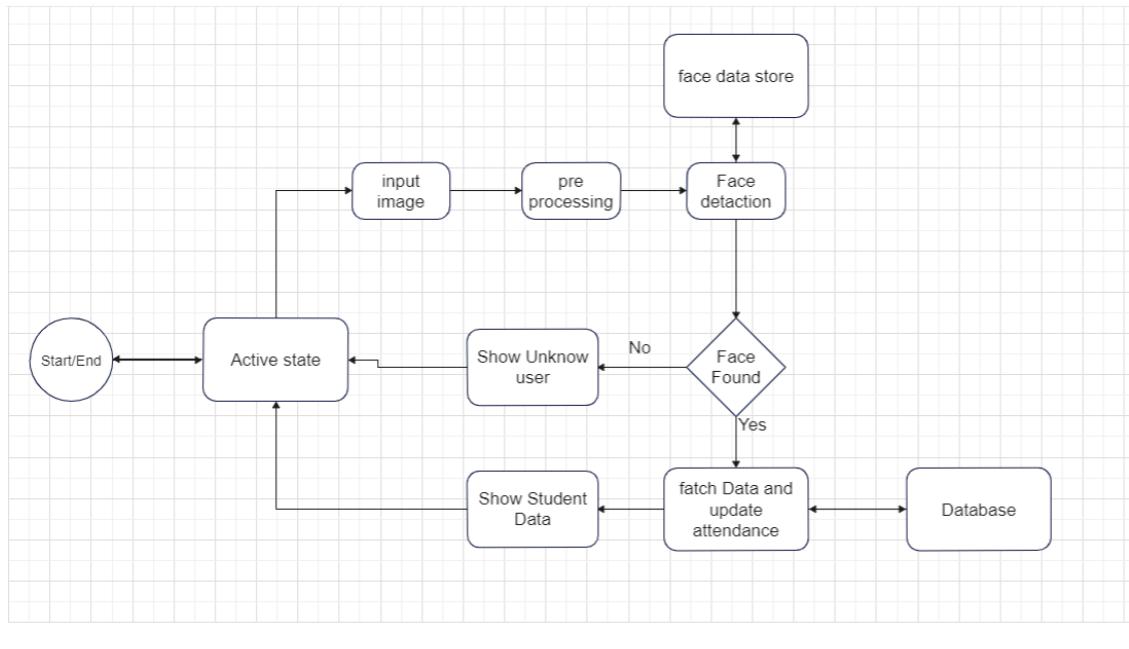


Figure 4.1: Functional Block Diagram

4.6 Functions/Modules Details

In my project, we have two modules. The first module takes user data and stores it in the database, second module recognise the face.

Chapter 5

LITERATURE SURVEY

5.1 Implementation of classroom attendance system based on face recognition in class

- a. Capture and Enhance the Classroom Image
 - A camera captures the image of the classroom.
 - The system enhances the image to make it clearer for face detection and recognition.
- b. Detect Faces in the Image
 - The system uses the Viola-Jones algorithm to detect faces in the enhanced image.
 - This algorithm can detect faces in different positions and lighting conditions.
- c. Crop and Recognize Faces
 - The detected faces are cropped from the image.
 - The cropped faces are compared to a database of face templates.

- The Eigenface method is used for face recognition.
- d. Mark Attendance
- If a student's face is recognized, their attendance is marked on a server.
- e. Obtain Class Information
- A timetable module provides the system with the subject, class, date, and time of the current class.
- f. Start Attendance
- Teachers can start the attendance process by pressing a button.

5.2 Face Recognition-based Lecture Attendance System

- a. System Configuration
- The system employs two cameras: one for seating position detection and the other for face capture.
 - The ceiling-mounted camera identifies seating positions.
 - The front-facing camera captures students' faces.
- b. Active Student Detection (ASD)
- The ASD method estimates the presence of a student in a seat.
 - The camera targets the specified seat for image capture.
 - The captured face image undergoes enhancement, recognition, and storage in the database.
- c. Attendance Estimation

- Each seat is associated with a vector of values representing the student-seat relationship.
- Continuous facial recognition data is analyzed to estimate attendance.
- The position and attendance of each student are recorded in the database.

5.3 Study of Implementing Automated Attendance System Using Face Recognition Technique

The proposed system is implemented in three basic steps:

- a. **Face Detection and Extraction:** The user stands in front of the camera and an image is captured. The frontal face is detected using the OpenCV Haar Cascade method and converted into a grayscale image of 50x50 pixels.
- b. **Learning and Training Face Images:** The system is initialized with a set of training images of faces. The PCA algorithm is performed on these images. All the learned data is stored in an XML file.
- c. **Recognition and Identification:** The frontal face to be recognized, known as the test face, is extracted from the image. The Eigen value for the test face is recalculated and matched with the stored data for the closest neighbor. The distance between the projected test face and each projected training set is computed using the "Squared Euclidean Distance." When a face is matched, the corresponding information is obtained from the database. The log table is then updated with the system time to mark the attendance of that person.

5.4 Face Recognition Based Attendance Marking System

The system involves a camera positioned in the office room to capture snapshots. These images are sent to an enhancement module where Histogram Normalization enhances the image contrast, and a Median Filter removes noise. To avoid false detection, a skin classification technique is used, which classifies the skin, retains only the skin pixels, and sets other pixels to black.

The enhanced image is then sent to a face detection and recognition module, which requires MATLAB software version 7.6. Two databases are maintained: the Face database stores the face images and extracted features during the enrollment process, and the Attendance database contains employee information and is used to mark attendance.

5.5 Attendance Management System Using Face Recognition

This system uses a CCTV camera positioned at the classroom entrance to capture images of students as they enter. The detected faces are stored in a database and compared with existing images using the Eigenfaces method.

A 3D face recognition technique is used to determine if the student's image matches any in the database. If a match is found, that image is processed for attendance management. The attendance is marked for the matched student image, and the information is sent to a server that manages the overall student database.

The software can be installed on a smartphone to enhance report features. If the server receives a message that a student is absent on a particular day, it will send an SMS to the parent of that student.

Chapter 6

SYSTEM REQUIREMENTS SPECIFICATION

6.1 Hardware Requirements

- Processor – i3
- Hard Disk – 5 GB
- Memory – 1GB RAM

6.2 Software Requirements

- **Python:** We write machine learning algorithm in python.
- **PyCharm:** PyCharm is an integrated development environment (IDE) used for programming in Python. It provides a wide range of essential tools for Python developers.
- **Tensorflow:** an open-source machine learning and neural network toolkit. Tensorflow is the go-to library for numerical computation and large-scale machine learning.

- **scikit-learn:** Simple and efficient tools for data mining and data analysis.
- **OpenCV:** an open-source library of functions aimed at real-time computer vision.
- **pickle:** this is use to save and open the machine learning model.
- **face-recognition:** this python module is implementing the face recognition algorithm.
- **Dlib:** Dlib is a facial landmark detector that uses pre-trained models to estimate the location of 68 coordinates (x, y) that map facial points on a person's face.
- **tkinter:** this python module use to process on image.
- **Firebase:** this is the database where all the student data we store and update attendance in real time

6.3 Functional Requirements

many advantages associated to using Firebase database are

- Reliable and extensive databases.
- Fast and safe hosting.
- Free multi-platform Firebase authenticatio.
- Firebase testing services to improve app quality.
- Increment in revenues with app indexing API.
- No application file I/O code to write and debug.

Chapter 7

SYSTEM ANALYSIS AND DESIGN

7.1 Viola Jones Algorithm

In 2004 an article by Paul Viola and Michael J. Jones titled “Robust Real-Time Face Detection” was published in the International Journal of Computer Vision. The algorithm presented in this article has been so successful that today it is very close to being the de facto standard for solving face detection tasks. This success is mainly attributed to the relative simplicity, the fast execution and the remarkable performance of the algorithm. The scale invariant detector The first step of the Viola-Jones face detection algorithm is to turn the input image into an integral image. This is done by making each pixel equal to the entire sum of all pixels above and to the left of the concerned pixel. This is demonstrated in Figure 7.1

<table border="1"><tr><td>1</td><td>1</td><td>1</td></tr><tr><td>1</td><td>1</td><td>1</td></tr><tr><td>1</td><td>1</td><td>1</td></tr></table>	1	1	1	1	1	1	1	1	1	<table border="1"><tr><td>1</td><td>2</td><td>3</td></tr><tr><td>2</td><td>4</td><td>6</td></tr><tr><td>3</td><td>6</td><td>9</td></tr></table>	1	2	3	2	4	6	3	6	9
1	1	1																	
1	1	1																	
1	1	1																	
1	2	3																	
2	4	6																	
3	6	9																	
Input image	Integral image																		

Figure 7.1: - Viola Jones algorithm

This allows for the calculation of the sum of all pixels inside any given rectangle using only four values. These values are the pixels in the integral image that coincide with the corners of the rectangle in the input image. This is demonstrated in Figure 7.2

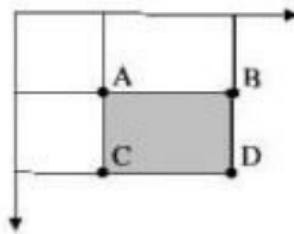


Figure 7.2: - Sum of Pixels

$$\text{Sum of grey rectangle} = D - (B + C) + A$$

Since both rectangle B and C include rectangle A, the sum of A has to be added to the calculation. It has now been demonstrated how the sum of pixels within rectangles of arbitrary size can be calculated in constant time. The Viola-Jones face detector analyzes a given sub-window using features consisting of two or more rectangles. The different types of features are shown in Figure 7.3

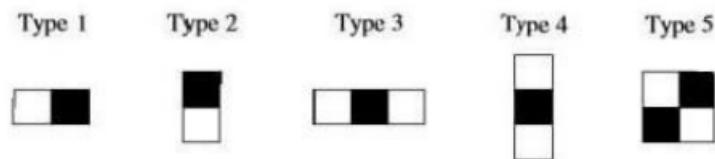


Figure 7.3: - Different Types of Features

Each feature results in a single value which is calculated by subtracting the sum of the white rectangle(s) from the sum of the black rectangle(s).

7.2 Proposed System

We're proposing a system to manage attendance in classroom lectures using face detection. This system will keep track of each student's attendance and their positions in the classroom by continuously observing and recording.

The current method involves placing a camera at the classroom entrance for real-time face recognition. Our project aims to build an attendance marking system using facial recognition, which will be easier than manual or traditional methods.

We're designing this solution to be robust, scalable, and compatible with existing IoT setups. A camera system will capture video footage, from which we'll extract frames containing faces. These images will be pre-processed and then analyzed by a facial detection algorithm to identify facial features.

Finally, an identification algorithm will match the captured face with a pre-existing database to determine the student's identity. This is how we'll mark attendance.

Chapter 8

IMPLEMENTATION

8.1 Code:

8.1.1 AutoEncoding.py

```
import cv2
import face_recognition
import pickle
import os

class AutoEncoading:
    def __init__(self):
        self.studentIds = []
        self.PathList = os.listdir('Images')
        for path in self.PathList:
            self.studentIds.append(os.path.splitext(path)[0])

    def findEncodings(self,images):
        encodeList = []

        for img in images:
            img = cv2.cvtColor(img, cv2.COLOR_BGR2RGB)
            encode = face_recognition.face_encodings(img)[0]
            encodeList.append(encode)

        return encodeList
```

```
for imgPath in images:
    img = cv2.imread(f'Images/{imgPath}')
    gray_img = cv2.cvtColor(img, cv2.COLOR_BGR2GRAY)
    faceLocations = face_recognition.face_locations(gray_img)
    if len(faceLocations) > 0:
        encode = face_recognition.face_encodings(img, [faceLocations[0]])
        encodeList.append(encode)

    return encodeList

def getEncoading(self):
    print("Encoding Started ...")
    encodeListKnown = self.findEncodings(self.PathList)
    encodeListKnownWithIds = [encodeListKnown, self.studentIds]
    print("Encoding Complete")
    try:
        file = open("EncodeFile.p", 'wb')
        pickle.dump(encodeListKnownWithIds, file)
        file.close()
    except:
        print("there is an error while saving model.")
    print("File Saved")

Au = AutoEncoading()
Au.getEncoading()
```

more code available on github- <https://github.com/amansetu03/face-attendance-system>

8.2 Flowchart

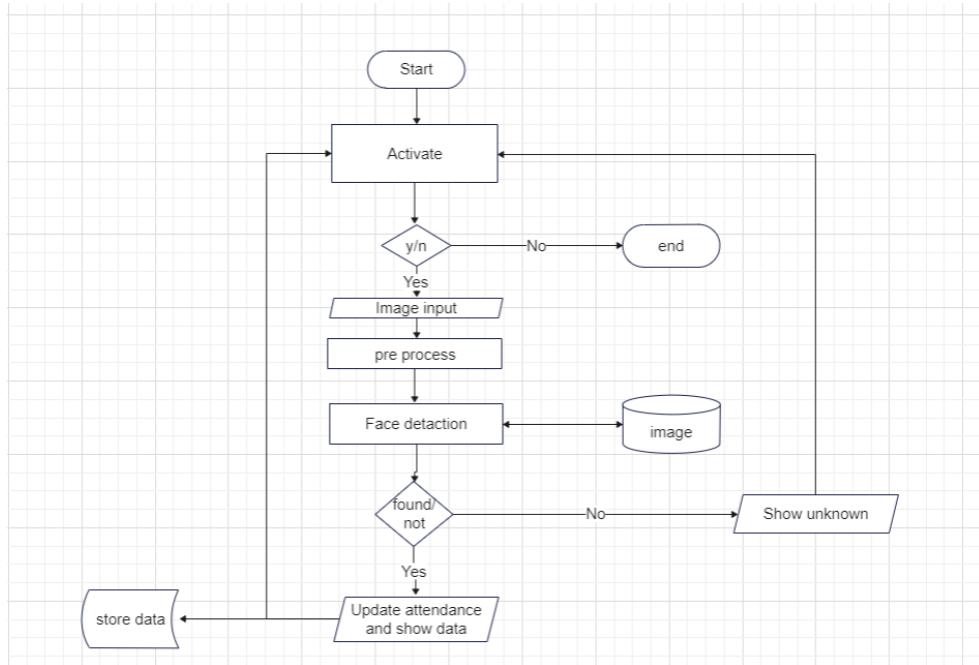


Figure 8.1: - Flowchart

Chapter 9

RESULTS

here some images of the project.

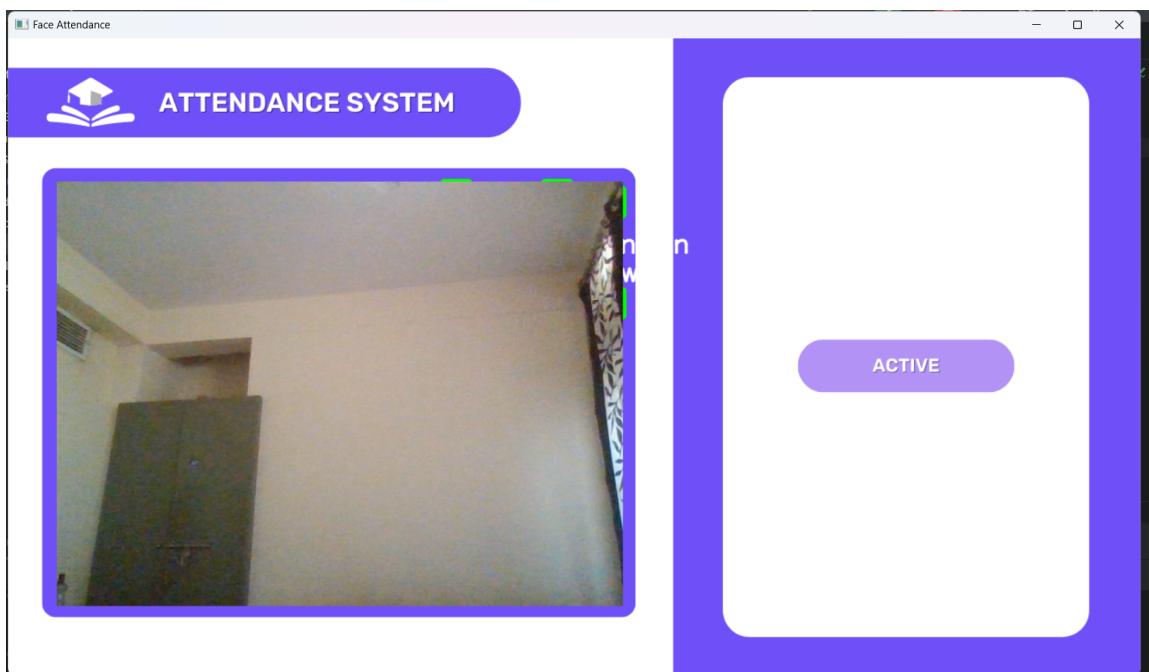


Figure 9.1: - output1

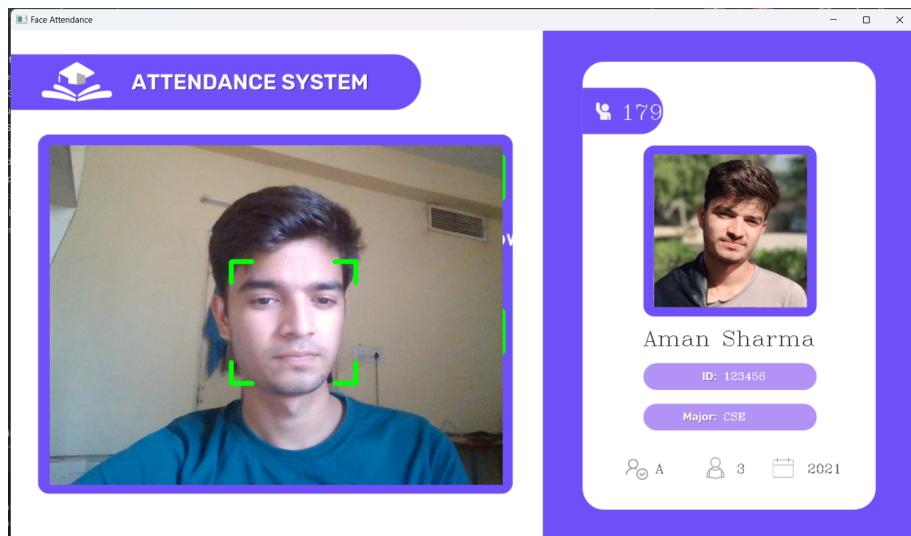


Figure 9.2: - output2

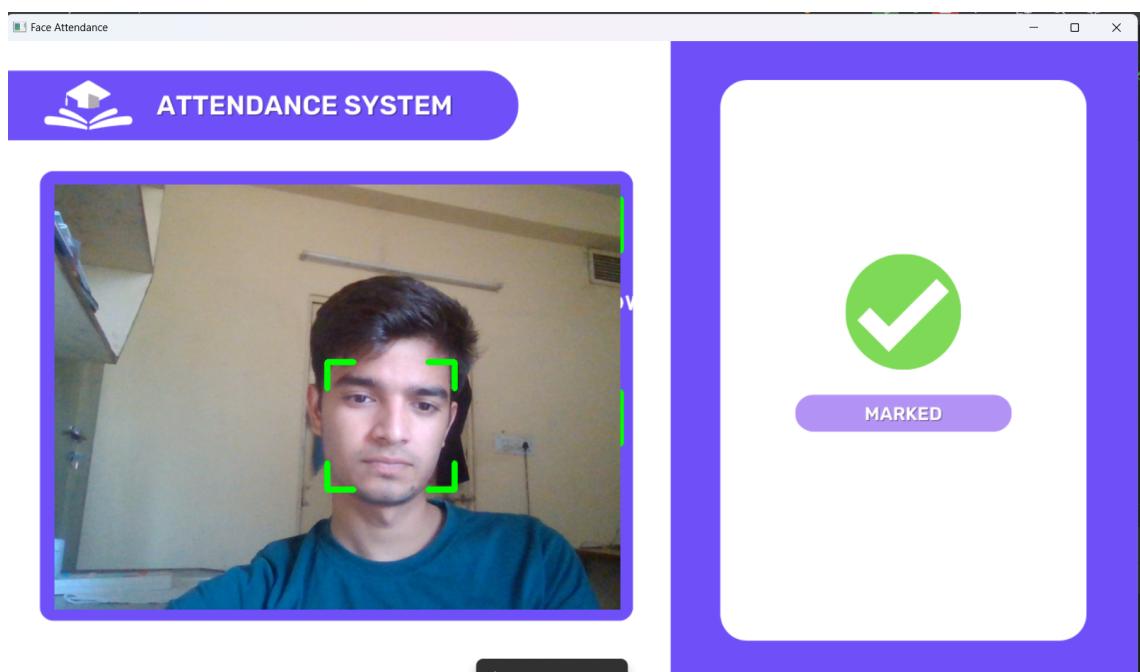


Figure 9.3: - output3

Chapter 10

CONCLUSION

- The report presents a face attendance system that uses facial recognition technology to automate the process of attendance tracking.
- The system consists of two modules: one for capturing and storing face images in a database, and another for recognizing and identifying faces from the database.
- The system uses the Viola-Jones algorithm for face detection, the Eigenface method for face recognition, and Firebase for online database management.
- The system aims to overcome the challenges posed by manual and traditional methods of taking attendance, such as time consumption, human error, and fraud.

Chapter 11

REFERENCES

- honen, Timo, Abdenour Hadid, and Matti Pietikainen. “**Face description with local binary patterns: Application to face recognition.**” IEEE transactions on pattern analysis and machine intelligence 28.12 (2006): 2037–2041
- LBPH OpenCV:
https://docs.opencv.org/2.4/modules/contrib/doc/facerec/facerec_tutorial.html#local-binary-patterns-histograms
- <http://ieeexplore.ieee.org/xpl/articleDetails.jsp?tp=&arnumber=5274642&queryText%3Dface+detection>
- <https://www.w3schools.com/python/>
- www.arielhalevi.com/awesome-sites
