

**SCTR's Pune Institute of Computer
Technology,Pune**

A PROJECT REPORT ON
Face Recognition Attendance System

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Contents

1 Abstract	3
2 Introduction	4
3 ER diagram	5
4 Normalized schema (upto 2nd normal form)	6
5 Technologies used & Description of their use	7
6 Use Case diagram	9
7 Code Snippets	10
8 Screen Shots	12
9 Conclusion & Future scope	14

Abstract

The face recognition attendance project is a system designed to automate the process of tracking attendance in a classroom or workplace using facial recognition technology. The system uses a camera to capture images of individuals, which are then compared to a database of known faces to determine the identity of the person in question. Once the identity is confirmed, attendance is marked for that individual. The system is accurate, efficient, and user-friendly, providing a seamless experience for both teachers and students/employees. This project has the potential to revolutionize traditional attendance-taking methods and provide a more secure and reliable solution for attendance tracking.

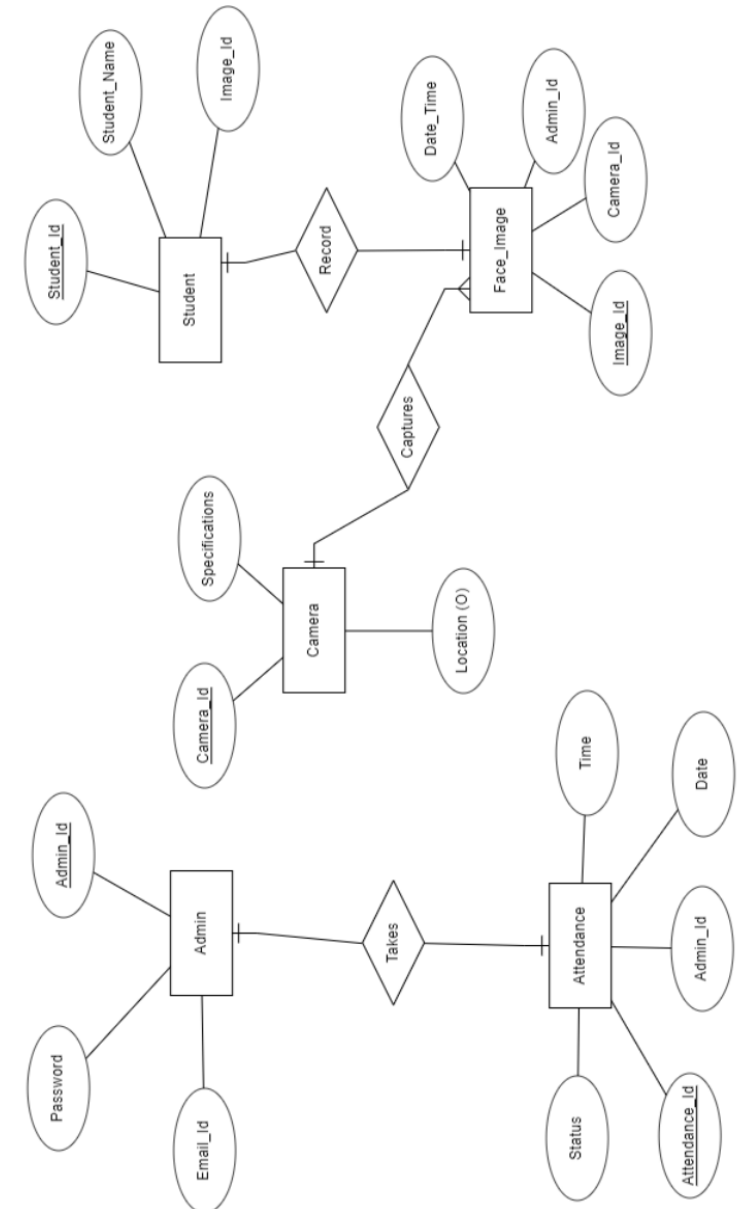
Introduction

The traditional method of taking attendance in classrooms or workplaces involves manually recording the presence of individuals, which can be time-consuming and prone to errors. The face recognition attendance project aims to provide an automated solution to this problem by using facial recognition technology to identify individuals and mark their attendance. The project is designed to streamline the attendance management process, saving time and reducing the chances of errors and fraud.

Facial recognition technology has advanced significantly in recent years, making it a reliable and efficient way to identify individuals. The technology works by analysing and comparing unique features of a person's face, such as the distance between the eyes or the shape of the nose. These features are then matched against a pre-stored database of known faces to determine the identity of the person in question.

The face recognition attendance project has significant potential in various industries, including education and corporate sectors. In workplaces, employers can use the system to track employee attendance, monitor work hours, and ensure compliance with company policies. The project can significantly reduce the administrative burden of attendance tracking and provide a secure and reliable solution for attendance management.

ER – DIAGRAM



Normalized schema

Admin (Admin_ID, Email, Password)

Student (Student_Id, Student_Name, Image_Id)

Attendance (Attendance_ID, Admin_ID, Date, Time, Status)

Camera (Camera_ID, Location, Specifications)

Face_Image (Image_ID, Camera_ID, Admin_ID, Date_Time)

Technologies used & Description of their use

Face recognition attendance systems use computer vision technology to identify individuals through their facial features. These systems can be used in a variety of settings, including schools, workplaces, and other organizations. Here are some key points to consider when designing a face recognition attendance system:

1. **Hardware:** You will need a camera to capture images of individuals' faces. Depending on the size of the group you need to accommodate, you may need multiple cameras or a camera with a wide field of view. You will also need a computer or other device to run the face recognition software.
2. **Face recognition algorithm:** There are many different algorithms available for face recognition, each with its own strengths and weaknesses. Some popular algorithms include Eigenfaces, Fisher faces, and Local Binary Patterns. You can choose an algorithm that suits your specific needs, or you can use a pre-trained algorithm provided by a face recognition software vendor.
3. **Training data:** To use a face recognition algorithm, you will need to train it using a set of images of known individuals. These images should be high-quality and well-lit, with the individuals facing the camera directly. You may need to collect this data yourself, or you may be able to purchase pre-collected data from a vendor.
4. **User interface:** You will need to design a user interface that allows individuals to check in and out using their face. This interface should be intuitive and easy to use, and it should provide feedback to the user to let them know whether their check-in was successful.
5. **Data storage and security:** You will need to store the attendance data securely, to ensure that it cannot be accessed by unauthorized individuals. You may also need to comply with regulations around data privacy, such as GDPR or HIPAA.

Overall, designing a face recognition attendance system requires careful planning and consideration of a wide range of factors, from the hardware and software to the user interface and data security.

Sure, here are some notes on front-end technologies like HTML, Flask, and CSS for a face recognition attendance system:

1. **HTML:** HTML (Hypertext Markup Language) is a markup language used to create the structure and content of web pages. In the context of a face

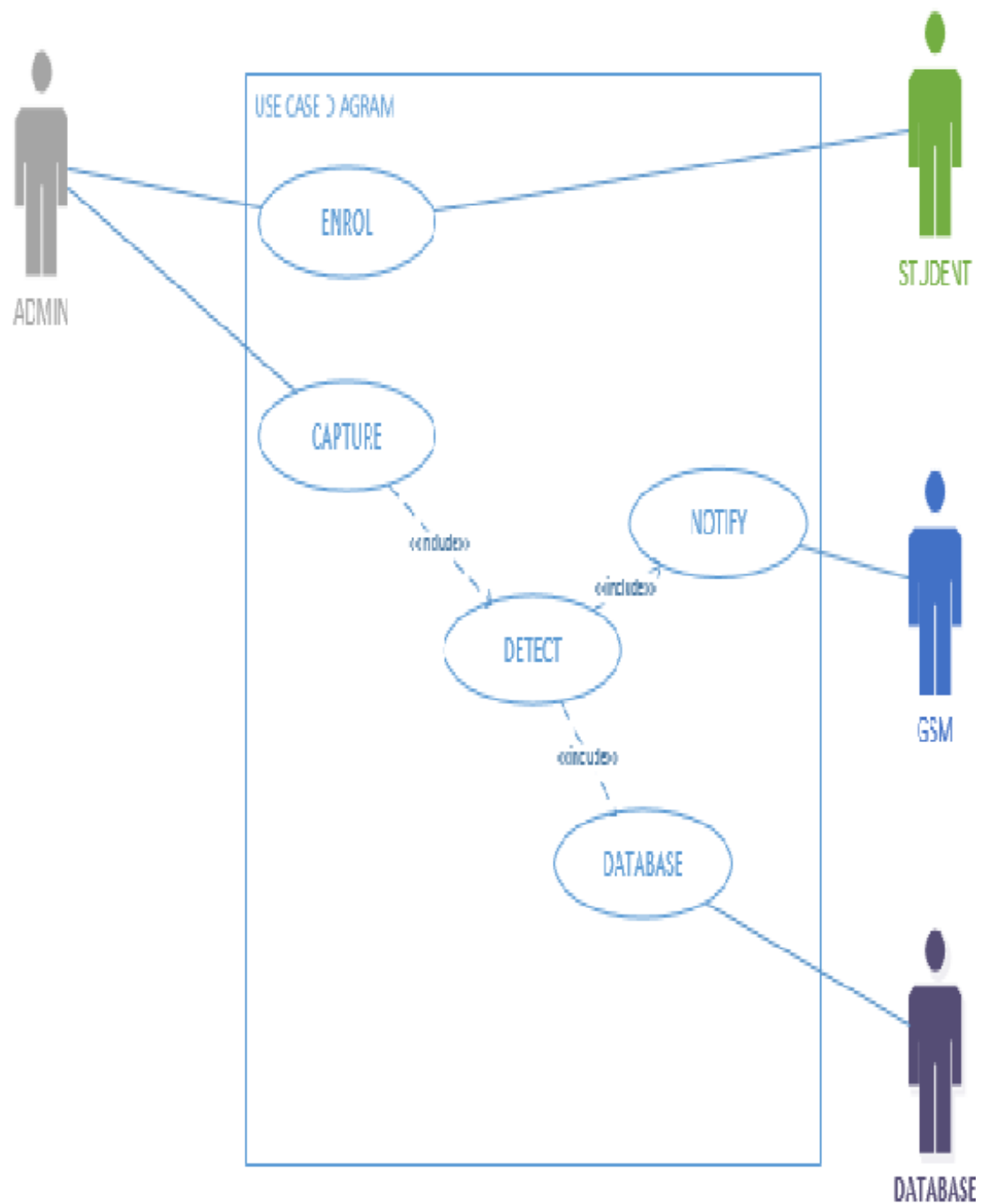
recognition attendance system, HTML can be used to create the user interface for the system. For example, you can use HTML to create a login form where users can input their username and password, or a page where users can view their attendance records.

2. Flask: Flask is a web framework for Python that allows you to create web applications quickly and easily. In the context of a face recognition attendance system, Flask can be used to create the back-end of the system. For example, you can use Flask to write the code that connects to the face recognition algorithm, stores attendance data in a database, or handles user authentication.

3. CSS: CSS (Cascading Style Sheets) is a stylesheet language used to describe the presentation of a document written in HTML. In the context of a face recognition attendance system, CSS can be used to style the user interface of the system. For example, you can use CSS to change the colour and font of text, add background images, or adjust the layout of the user interface.

When designing a face recognition attendance system, it's important to consider both the front-end and back-end technologies you'll use. HTML, Flask, and CSS are just a few examples of the many technologies you could use to create a face recognition attendance system. Depending on your specific needs, you may also need to consider other technologies, such as JavaScript for interactive user interfaces or Firebase for real-time data synchronization.

Use Case diagram



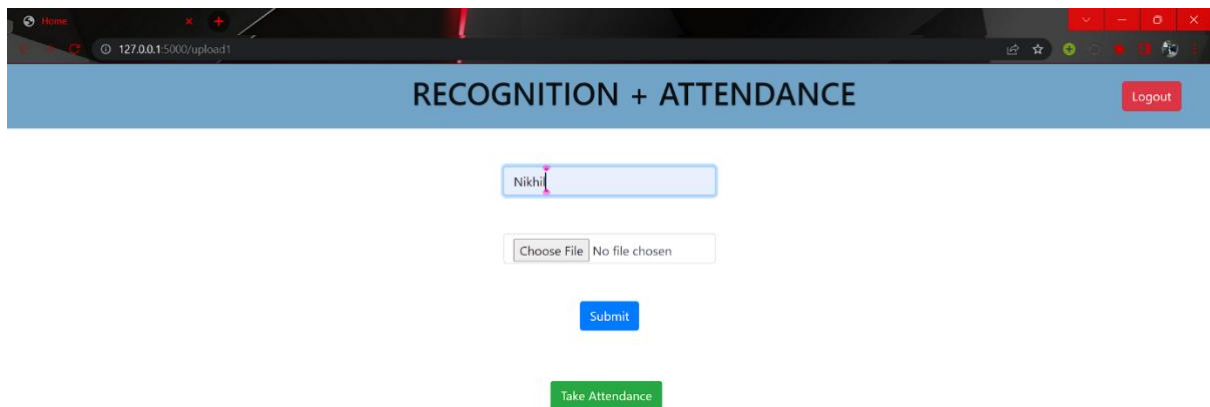
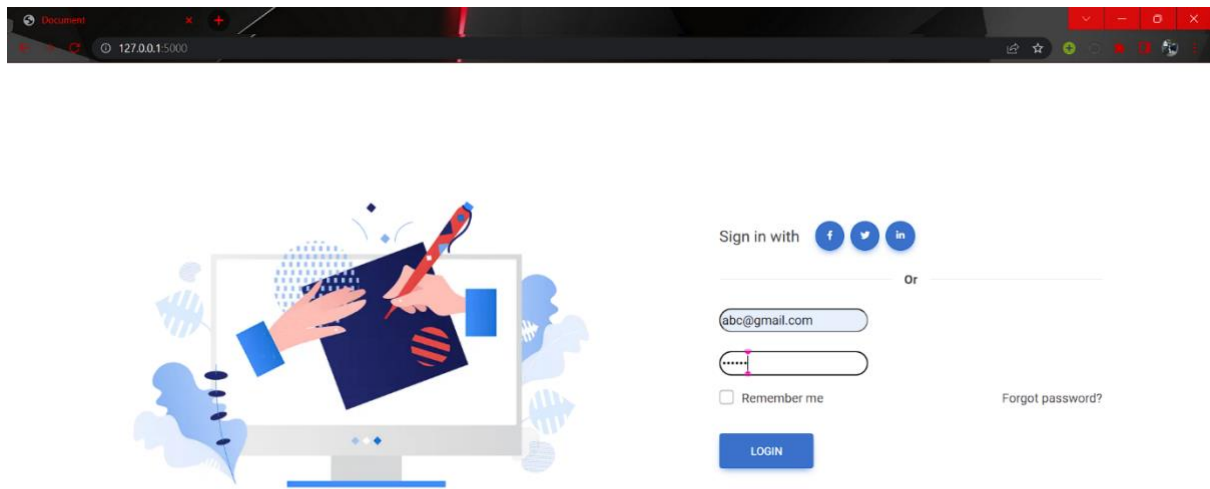
Code Snippets

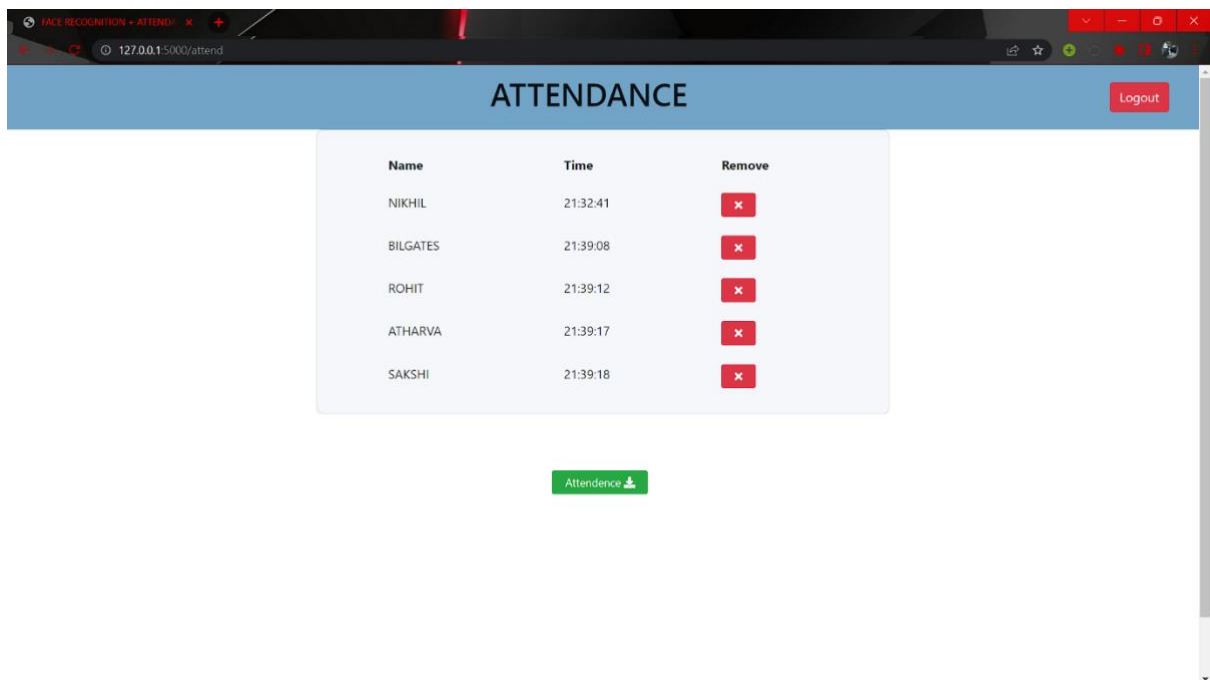
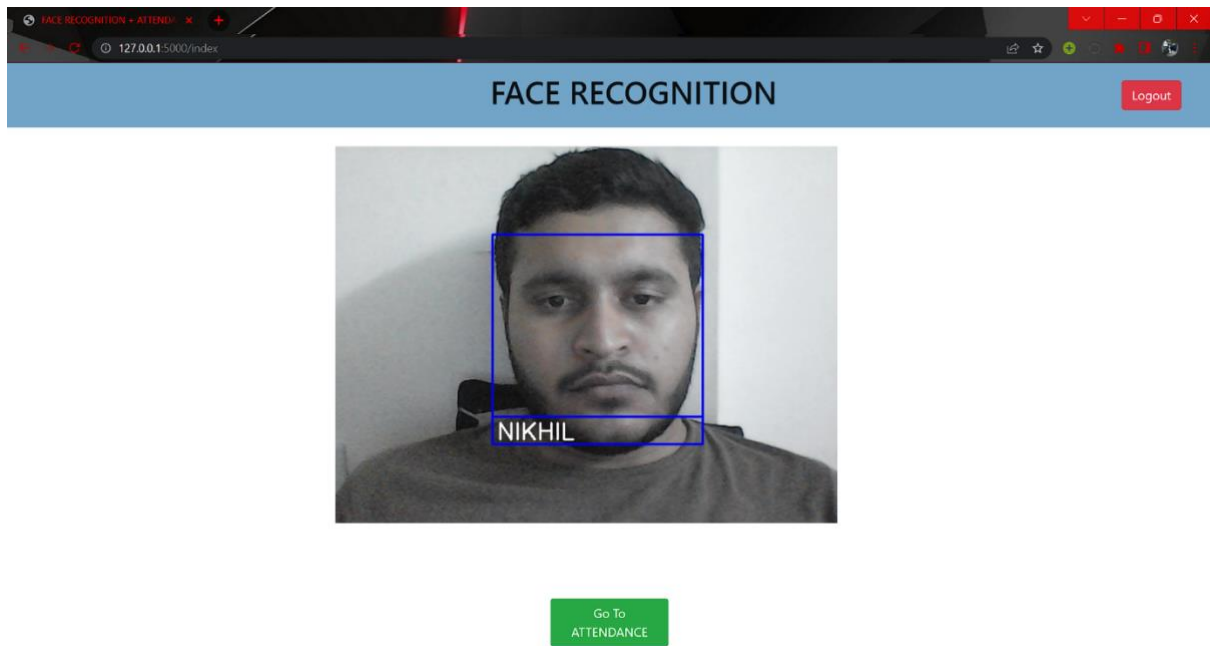
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File Edit Selection View Go Run Terminal Help
app.py - Visual Studio Code

C:\Users\ameya> Downloads > app.py > ...
1 import cv2
2 import numpy as np
3 import pandas as pd
4 import face_recognition
5 import os
6 from datetime import datetime
7 from flask import Flask, jsonify, request, session, redirect, url_for
8 from werkzeug.utils import secure_filename
9 import cv2
10 import json
11
12 UPLOAD_FOLDER = "IMAGE_FILES"
13 ALLOWED_EXTENSIONS = ('png', 'jpg', 'jpeg', 'gif')
14
15 def allowed_file(filename):
16     return '.' in filename and \
17         filename.rsplit('.', 1)[1].lower() in ALLOWED_EXTENSIONS
18
19 app = Flask(__name__)
20 app.secret_key = "secret key"
21 app.config['UPLOAD_FOLDER'] = UPLOAD_FOLDER
22
23 @app.route('/')
24 def index():
25     return render_template("index.html")
26
27 @app.route('/upload', methods=['POST'])
28 def upload_file():
29     if 'user' in session:
30         output = request.get_json()
31         output['success'] = True
32         session['user'] = output['email']
33         print(output['email'])
34         if 'user' in session:
35             return redirect(url_for('up'))
36         else:
37             return render_template("index.html")
38
39 @app.route('/upload')
40 def up():
41     if 'user' in session:
42         print(session['user'])
43         return render_template("upload.html")
44     else:
45         return render_template("index.html")
46
47 @app.route('/logout')
48 def logout():
49     session.pop('user')
50     print(session['user'])
51
52 @app.route('/success', methods=['GET', 'POST'])
53 def success():
54     if 'file' not in request.files:
55         return render_template("upload.html")
56     file = request.files['file']
57     if file.filename == '':
58         return render_template("upload.html")
59     if file and allowed_file(file.filename):
60         filename = secure_filename(file.filename)
61         file.save(os.path.join(app.config['UPLOAD_FOLDER'], file.filename))
62         print('upload_image filename: ' + filename)
63         # flash('Image successfully uploaded and displayed below')
64         return render_template("upload.html")
65     else:
66         # flash('Allowed image types -> png, jpg, jpeg, gif')
67         return render_template("upload.html")
68
69 @app.route('/index')
70 def index():
71     """Video streaming home page."""
72     f = open('attendance.csv', 'r+')
73     f.truncate(0)
74     f.close()
75     if 'user' in session:
76         return render_template("index.html")
77     else:
78         return render_template("index.html")
79
80 def gen():
81     IMAGE_FILES = []
82     dir_path = r'IMAGE_FILES'
83     for images in os.listdir(dir_path):
84         img_path = os.path.join(dir_path, images)
85         img_path = face_recognition.load_image_file(img_path)
86         IMAGE_FILES.append(img_path)
87         filename.append(images.split(".", 1)[0])
88
89 def encoding_img(IMAGE_FILES):
90     encodeList = []
91     for img in IMAGE_FILES:
92         img = cv2.cvtColor(img, cv2.COLOR_BGR2RGB)
93         encode = face_recognition.face_encodings(img)[0]
94         encodeList.append(encode)
95     return encodeList
96
97 def takeAttendance(name):
98     with open('attendance.csv', 'r+') as f:
99         mypeople_list = f.readlines()
100         nameList = []
101         for line in mypeople_list:
102             entry = line.split(',')
103             nameList.append(entry[0])
104             now = datetime.now()
105             if name not in nameList:
106                 detestring = now.strftime("%H:%M:%S")
107                 f.writelines(f'\n{name},{detestring}')
108
109 encodeListKnown = encoding_img(IMAGE_FILES)
110 # print(encodeListKnown)
111
112 cap = cv2.VideoCapture(0)
113
114 while True:
115     success, img = cap.read()
116     img = cv2.resize(img, (0, 0), None, 0.25, 0.25)
117     # converting image to RGB from BGR
118     img = cv2.cvtColor(img, cv2.COLOR_BGR2RGB)
119     facesCurrent = face_recognition.face_locations(img)
120     encode_facesCurrent = face_recognition.face_encodings(img, facesCurrent)
121
122     # faceLoc - one by one it grab one face location from faces
123     # then encodeface grab encoding from encode_facesCurrent
124     # we want them all in same loop so we are using zip
125     for encodeface, faceLoc in zip(encode_facesCurrent, facesCurrent):
126         matchesFace = face_recognition.compare_faces(encodeListKnown, encodeface)
127         face_distance = face_recognition.face_distance(encodeListKnown, encodeface)
128         # print(face_distance)
129         # finding minimum distance index that will return best match
130         matchIndex = np.argmin(face_distance)
131
132         if matchesFace[matchIndex]:
133             name = filename[matchIndex].upper()
134             # print(name)
135             y1, x2, y2, x1 = faceLoc
136             # multiply locations by 4 because we above we reduced our webcam input image by 0.25
137             # y1, x2, y2, x1 = y1*4, x2*4, y2*4, x1*4
138             cv2.rectangle(img, (x1, y1), (x2, y2), (255, 0, 0), 2)
139             cv2.rectangle(img, (x1, y2 - 35), (x2, y2), (255, 0, 0), 2, cv2.LINE_AA)
140             cv2.putText(img, name, (x1 + 6, y2 - 6), cv2.FONT_HERSHEY_SIMPLEX, 1, (255, 255, 255),
141                 takeAttendance(name)) # taking name for attendance function above
142
143             # cv2.imshow("camera", img)
144             # cv2.waitKey(0)
145             frame = cv2.imencode('.jpg', img)[1].tobytes()
146             yield (b'--frame\r\n' + b'Content-Type: image/jpeg\r\n\r\n' + frame + b'\r\n\r\n')
147             key = cv2.waitKey(20)
148             if key == 27:
149                 break
150
151 @app.route('/video_feed')
152 def video_feed():
153     """Video streaming route. Put this in the url attribute of an img tag."""
154     return Response(gen(),
155                     mimetype='multipart/x-mixed-replace; boundary=frame')
156
157 @app.route('/attend')
158 def attend():
159     with open('attendance.csv', 'r+') as csvfile:
160         csv_dict = (row for row in csv.DictReader(csvfile))
161         if len(csv_dict) == 0:
162             print('csv file is empty')
163             return render_template("index.html")
164         data = read_csv('attendance.csv', header=None)
165         print("HELLO")
166         return render_template("index.html")
167
168 @app.route('/download')
169 def download():
170     print('down')
171     if 'user' in session:
172         return render_template("attend.html", dt=datetime.now())
173     else:
174         return render_template("index.html")
175
176 @app.route('/delete/ctstring/name')
177 def delete(name):
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File Edit Selection View Go Run Terminal Help form.js - Visual Studio Code
form.js x
C:\Users\ameya> Downloads > JS form.js > ...
1 import { initializeApp } from "https://www.gstatic.com/firebasejs/9.21.0/firebase-app.js";
2 import { getAnalytics } from "https://www.gstatic.com/firebasejs/9.21.0/firebase-analytics.js";
3 import { getAuth, signInWithEmailAndPassword } from "https://www.gstatic.com/firebasejs/9.21.0/firebase-auth.js";
4 // TODO: Add SDKs for Firebase products that you want to use
5 // https://firebase.google.com/docs/web/setup#available-libraries
6
7 // Your web app's Firebase configuration
8 // For Firebase JS SDK v7.20.0 and later, measurementId is optional
9 const firebaseConfig = {
10   apiKey: "AIzaSyDj0sDkD9v_23M4sfmgH0dKq1",
11   authDomain: "attend2-f9147.firebaseio.com",
12   projectId: "attend2-f9147",
13   storageBucket: "attend2-f9147.appspot.com",
14   messagingSenderId: "908849179397",
15   appId: "1:908849179397:web:a7be071bcb97ed70712ee",
16 };
17
18 // Initialize Firebase
19 const app = initializeApp(firebaseConfig);
20 const analytics = getAnalytics(app);
21
22 // console.log(app);
23 const auth = getAuth(app);
24 // const database = firebase.database();
25
26 var email, password, signUpButton, confirmPassword, confirmSignUpPassword;
27 const signUpButton = document.getElementById("sign-up");
28 // const signUpButton = document.getElementById("sign-up");
29 const emailInput = document.getElementById("email");
30 const passwordInput = document.getElementById("password");
31
32 submitButton.addEventListener("click", function() {
33   email = emailInput.value;
34   password = passwordInput.value;
35   console.log(email);
36   console.log(password);
37
38   signInWithEmailAndPassword(auth, email, password)
39     .then((userCredential) => {
40       // Signed in
41       const user = userCredential.user;
42       console.log(email);
43       const data = {email};
44       const dataString = JSON.stringify(data);
45       // window.alert("Successfully login", "success");
46       // window.alert("Success! Welcome back!");
47       // window.location.replace("upload");
48       $.ajax({
49         url: "/upload",
50         type: "POST",
51         contentType: "application/json",
52         data: JSON.stringify(dataString),
53       });
54       // console.log(user);
55       // console.log(data);
56       // console.log(dataString);
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100      // console.log(dataString);
101    })
102    .catch((error) => {
103      const errorCode = error.code;
104      const errorMessage = error.message;
105      console.log("Error occurred. Try again.");
106      // window.alert("Error occurred. Try again.");
107      // window.alert("Ops...", "Something went wrong", "error");
108    });
109  });
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Screen Shots





Conclusion & Future scope

In conclusion, the face recognition attendance project is an innovative and efficient way to automate the process of attendance tracking. The project uses facial recognition technology to identify individuals and mark their attendance automatically, eliminating the need for manual tracking and reducing the chances of errors and fraud. The project has the potential to be implemented in various settings, including classrooms, workplaces, and events.

As for the future scope of the project, there are several areas that can be improved and expanded upon. Some of the possible future enhancements include:

1. Integration with other systems: The face recognition attendance project can be integrated with other systems, such as payroll, to streamline the process of attendance and salary calculation.
2. Improved accuracy and security: The facial recognition technology used in the project can be improved to increase accuracy and security, such as by using multi-factor authentication and anti-spoofing measures.
3. Mobile application: A mobile application can be developed to enable users to access the attendance records and mark attendance remotely.
4. Real-time analytics: The project can be enhanced to provide real-time analytics and insights into attendance trends, patterns, and performance, helping administrators to make informed decisions.
5. Customization: The system can be customized to meet the specific needs of different organizations, such as by adding new features or modifying existing ones.

Overall, the face recognition attendance project has the potential to revolutionize the way attendance is tracked, providing a more accurate, efficient, and secure alternative to traditional manual methods. With further development and enhancements, the project can be extended to various domains and help to improve productivity, efficiency, and security in a wide range of settings.