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Automated Attendance System using RFID and Face Recognition

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Abstract: *Automated attendance systems have come decreasingly popular due to their effectiveness and delicacy. This exploration paper presents a system that uses both RFID and face recognition technologies to automate the attendance process. The proposed system utilizes RFID markers to identify scholars and staff as they enter the classroom or structure, while face recognition technology is used to corroborate their identity. The system is designed to be stoner-friendly and effective, reducing the time and trouble needed to take attendance manually. The exploration paper also presents a comparison between traditional attendance systems and the proposed automated attendance system.*

Keywords: RFID Technology, Face Recognition, Attendance System

I. INTRODUCTION

The traditional method of taking attendance in schools, universities, and organizations involves a manual process, which is time-consuming, prone to errors, and difficult to manage[1]. To overcome these limitations, an automated attendance system using RFID and face recognition technology has been developed. This system offers numerous benefits such as increased accuracy, efficiency, and real-time monitoring. Automated attendance systems using RFID and face recognition technologies are gaining popularity due to their accuracy and efficiency. These systems have the potential to eliminate the drawbacks of traditional attendance systems such as time-consuming manual recording, human error, and proxy attendance[2]. In all colleges, maintaining attendance is crucial for evaluating students' performance. Every college has a unique approach in this area. Some have adopted the practises of automatic attendance using some biometric techniques[3], while others continue to manually record student attendance on attendance registers, mark attendance sheets, or file-based approaches. However, with these techniques, students must wait a long time to enter the classroom and form a queue. Although there are many biometric systems on the market, all of them use the same key authentications. Each biometric system begins with an enrollment process during which a person's distinctive characteristics are saved in a database.

II. FACE RECOGNITION TECHNOLOGY

Face recognition technology uses algorithms to identify and corroborate a person's identity grounded on their facial features. In the proposed system, a camera is installed at the entrance of the classroom or structure. As the person enters, the camera captures their image, and the software compares it with the database of registered images to corroborate their identity. Using algorithms, face recognition technology can recognise and confirm a person's identification based on their facial features. The proposed solution places a camera at the building or classroom's entrance. The camera records the person's image as they enter, and the software verifies their identification by comparing it to the database of registered images. Radio waves are used by RFID technology to identify and track items. The identify of the person or thing that an RFID marker is attached to is one of the types of information that it can keep. Each student and employee in the proposed system receives an RFID label that is tied to their ID card or rope.

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The RFID anthology recognises the individual when they go into the building or classroom and reads the label on their clothing.

Code for Face Recognition:

```
import numpy as np import cv2,os
from PIL import Image import pickle
import sqlite3
recognizer = cv2.createLBPHFaceRecognizer() recognizer.load("recognizer\\trainingData.yml")
cascadePath = 'haarcascade_frontalface_default.xml' faceCascade = cv2.CascadeClassifier(cascadePath)
path = 'dataSet' def getProfile(id):
conn =sqlite3.connect("FaceBase.db")
cmd = "SELECT * FROM People WHERE ID="+str(id) cursor = conn.execute(cmd)
profile=None
for row in cursor: profile=row conn.close() return profile
cam = cv2.VideoCapture(0)
font = cv2.cv.InitFont(cv2.cv.CV_FONT_HERSHEY_SIMPLEX, 1, 1, 0, 1, 1) #create a font while True:
ret, img = cam.read() img2 = cv2.flip(img, 1)
gray = cv2.cvtColor(img2,cv2.COLOR_BGR2GRAY) faces = faceCascade.detectMultiScale(gray,
scaleFactor=1.2,minNeighbors=5,minSize=(100, 100),flags=cv2.CASCADE_SCALE_IMAGE)
for(x,y,w,h) in faces:
id, conf = recognizer.predict(gray[y:y+h,x:x+w]) cv2.rectangle(img2,(x,y), (x+w,y+h), (255,0,0),2)
profile=getProfile(id)
if(profile!=None):
cv2.cv.PutText(cv2.cv.fromarray(img2),"ID"+str(profile[0]),(x,y+h+30),font,200)
cv2.cv.PutText(cv2.cv.fromarray(img2),"Name "+str(profile[1]),(x,y+h+60),font,200)

# Draw the Text
cv2.cv.PutText(cv2.cv.fromarray(img2),"Age"+str(profile[2]),(x,y+h+90),font,255)
cv2.cv.PutText(cv2.cv.fromarray(img2),"Gender "+str(profile[3]),(x,y+h+120),font,255) else:

cv2.cv.PutText(cv2.cv.fromarray(img2),"ID Unknown",(x,y+h+30),font,200)
cv2.cv.PutText(cv2.cv.fromarray(img2),"Name Unknown",(x,y+h+60),font,200)
cv2.cv.PutText(cv2.cv.fromarray(img2),"Age Unknown",(x,y+h+90),font,200)
cv2.cv.PutText(cv2.cv.fromarray(img2),"Gender Unknown",(x,y+h+120),font,200)

cv2.imshow('im',img2) if(cv2.waitKey(1) == ord('q')):
break cam.release()
cv2.destroyAllWindows()
```

Code for dataset Creator:

```
import numpy as np import sqlite3 import cv2
detector= cv2.CascadeClassifier('haarcascade_frontalface_default.xml') cap = cv2.VideoCapture(0)

def insertOrUpdate(Id,Name):
conn = sqlite3.connect("FaceBase.db")
cmd = "SELECT * FROM people WHERE ID="+str(Id) cursor=conn.execute(cmd)

isRecordExist = 0 for row in cursor:
isRecordExist = 1
if(isRecordExist == 1):
```

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```
cmd="UPDATE people SET Name="+str(Name)+" WHERE ID="+str(Id)
else:
cmd="INSERT INTO people(ID,Name) Values("+str(Id)+","+str(Name)+") " conn.execute(cmd)
conn.commit() conn.close()
Id=raw_input('Enter user id')
name = raw_input('Enter user name') insertOrUpdate(Id,name) sampleNumber=0
while(True):
ret, img = cap.read() img2 = cv2.flip(img, 1)
gray = cv2.cvtColor(img2, cv2.COLOR_BGR2GRAY) faces = detector.detectMultiScale(gray, 1.3, 5)
for (x,y,w,h) in faces: cv2.rectangle(img2,(x,y),(x+w,y+h),(10,0,130),2) sampleNumber=sampleNumber+1
cv2.imwrite("dataSet/User."+Id+"."+str(sampleNumber)+".jpg",gray[y:y+h,x:x+w]) cv2.imshow('frame',img2)
if cv2.waitKey(300) & 0xFF == ord('q'):
break
elif sampleNumber > 20:
break cap.release()
cv2.destroyAllWindows()
Code for FACE DETECTION:-
import numpy as np import cv2

detector= cv2.CascadeClassifier('haarcascade_frontalface_default.xml') cap = cv2.VideoCapture(0)
while(True):
ret, img = cap.read()
gray = cv2.cvtColor(img, cv2.COLOR_BGR2GRAY) faces = detector.detectMultiScale(gray, 1.3, 5)
for (x,y,w,h) in faces: cv2.rectangle(img,(x,y),(x+w,y+h),(10,0,130),2) img2 = cv2.flip(img, 1)
cv2.imshow("Original", img2)
if cv2.waitKey(1) & 0xFF == ord('q'): break
cap.release() cv2.destroyAllWindows()
```

III. COMPARISON WITH TRADITIONAL ATTENDANCE SYSTEMS

Traditional attendance systems bear homemade trouble, which can be time- consuming and error-prone. The proposed system eliminates the need for homemade trouble and provides accurate attendance records. The proposed system is also briskly, as it takes attendance automatically when the person enters the classroom or structure. also, it reduces the possibility of fraud and provides real- time attendance reports. Traditional attendance
methods have problems that are time-consuming and prone to mistakes. The suggested solution does away with the requirement for handmade trouble and offers precise
attendance records. The proposed system operates quickly because it immediately takes attendance as soon as a person enters a building or classroom. Additionally, it offers real- time attendance records and lowers the chance of fraud. Human lifestyle is being moved towards automation and realism by Radio Frequency Identification (RFID) technology, a practical and adaptable technology that is well suited for completely automated systems.By incorporating RFID into attendance management systems, tasks for both users and
administrators are made simple, clever, practical, and easy.

IV. RESULT

Image resizing, rotation, and background removal are all part of the geometric transformation and cropping process. Equalisation of the histogram The brightness and contrast of the image are standardised through this technique.
Image noise is removed using some filters during the smoothing process. Elliptical mask: The elliptical mask eliminates some backdrop that is still present.

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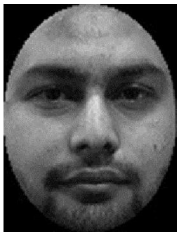
1.Geometrical transformation and cropping


2.Histogram equalization


3.Smoothing


4.Elliptical mask

V. CONCLUSION

The automated attendance system that is being presented, which makes use of RFID and face recognition technology, offers a reliable and precise method of taking attendance. The method is user-friendly for stoners and does away with the necessity for DIY difficulties.

Additionally, it offers real-time attendance records and lowers the chance of fraud. The system has the inherent ability to change how attendance is handled in commercial and academic organisations

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