PROJECT TITLE:
Smart Attendance System on Raspberry Pi

TEAM DETAILS:
Total team strength: 3
  [Name   (Enrolment Number)]
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INTRODUCTION:
A smart attendance system is very crucial and important for any kind of business or institution. A good and efficient attendance system helps in monitoring the regularity of people. A smart attendance system increases the speed of taking attendance and reduces the chances of proxies.

MOTIVATION:
The traditional way of attendance has many loopholes which gives way to proxies and errors. So we aimed to remove these vulnerabilities in the attendance system. Because we will use face detection and verification for marking attendance so scope of proxies is null. Future of this system can be that student shall not cheat the system by using just some photographs.

OBJECTIVES:
In this project, we aim to train a model for taking a picture from the camera and recognizing the face of the person in the picture and marking the attendance for that person on an excel sheet

CONTRIBUTIONS/ METHODOLOGY:
We aim to do the project in the following way:
1) We will take a dataset of 10-15 students with at least 10 photos of each student (including different orientations)
2) We will pre-process the images by firstly, detecting the face in each image, secondly, we normalize the images to the front facing orientation by extracting features (such as eyes, nose, and mouth) and distorting the image to make it front facing, lastly the model extracts parameters from the face (such as the distance between the eyes) and stores them in a vector for each of the training images
3) We give the vector of each image as training data for a classification model and train it on our computer
4) We test the model and try to improve its accuracy by data augmentation if needed

5) We then load the model on a Raspberry Pi and write code for extracting images from cameras connected to it
6) We record attendance and put it on an excel sheet

TECHNOLOGIES USED:
This project uses the following technologies
1. Python
2. OpenCV
3. NumPy and SciPy
4. Raspberry Pi

SOFTWARE REQUIREMENTS SPECIFICATION:

Functional Requirements:
1. The system should be able to detect faces from both images and video.
2. The system should be able to identify faces of people whose face is detected and is present in the database.
3. The system should be able to mark attendance of people whose face is verified.
4. System should have certain checks against proxies and errors.
5. System should detect movements or else it could be cheated using still images.

Non-Functional Requirements:
1. System should have following software installed to run properly:
    -> Python 3.2.*
    -> Opencv-Python
    -> Jupyter
    -> Scikit Learn
    -> Keras
2. System should be able to implement on Raspberry Pi, whose hardware specifications are:
    -> Quad Core 1.2GHz Broadcom BCM2837 64bit CPU
    -> 1GB RAM BCM43438
    -> wireless LAN and Bluetooth Low Energy (BLE) on board
    -> 100 Base Ethernet 40-pin extended GPIO
    -> 4 USB 2 ports, 4 Pole stereo output and composite video port Full size HDMI
    -> CSI camera port for connecting a Raspberry Pi camera
    -> DSI display port for connecting a Raspberry Pi touchscreen display
    -> Micro SD port for loading your operating system and storing data
    -> Upgraded switched Micro USB power source up to 2.5A

REFERENCES:
1) https://medium.com/@ageitgey/machine-learning-is-fun-part-4-modern-face-recognition-with-deep-learning-c3cffc121d78
2) Multiple Face Detection and Recognition in Real Time - CodeProject
3) Multiple Face Detection and Recognition in Real-Time using Open CV – IJERT