

AUTOMATIC ATTENDANCE SYSTEM USING FACE RECOGNITION

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A brief look at what we will discuss on this report

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Abstract

A facial recognition system is a technology capable of matching a human face from a digital image or a video frame against a database of faces, typically employed to authenticate users through ID verification services, works by pinpointing and measuring facial features from a given image. Although the accuracy of facial recognition systems as biometric technology is lower than iris recognition and fingerprint recognition, it is widely adopted due to its contactless process and this is very favourable during this pandemic situation.

Objective

To set up a contactless automatic attendance system using face recognition that can be easily deployed and implemented.

This would help in

- Eliminating chances of false attendance and missed entries
- Cheaper alternative to fingerprint authentication
- Ease of automation made available to Teachers and Employers
- Implementation option in online classes and sessions

Requirements

Software:

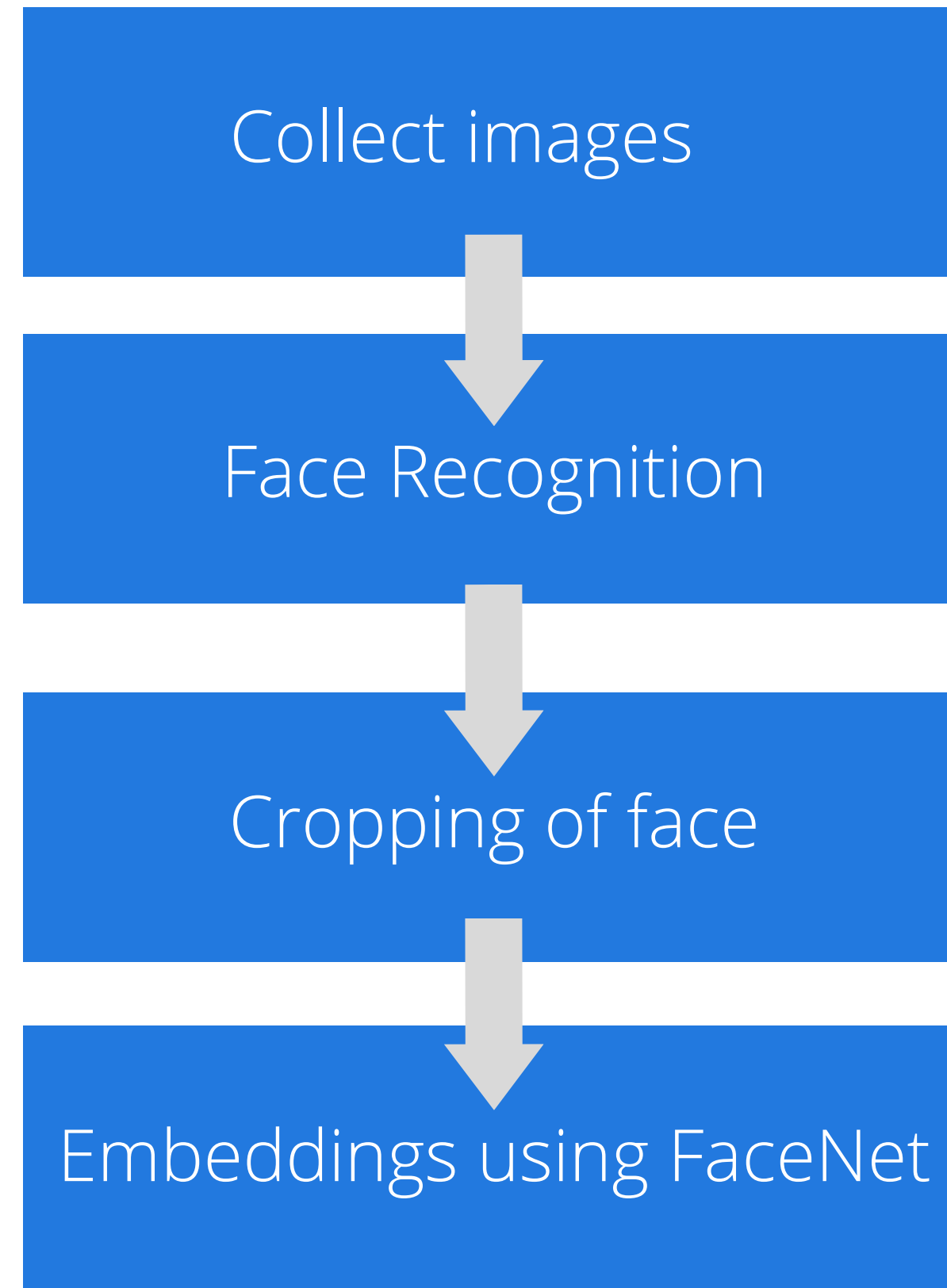
- Python
- MTCNN Face Recognition Library
- FaceNet by Keras
- TensorFlow
- OpenCV

For hardware implementation:

- Raspberry Pi
- Pi camera / Supported Camera
- Enclosure
- Server, Database

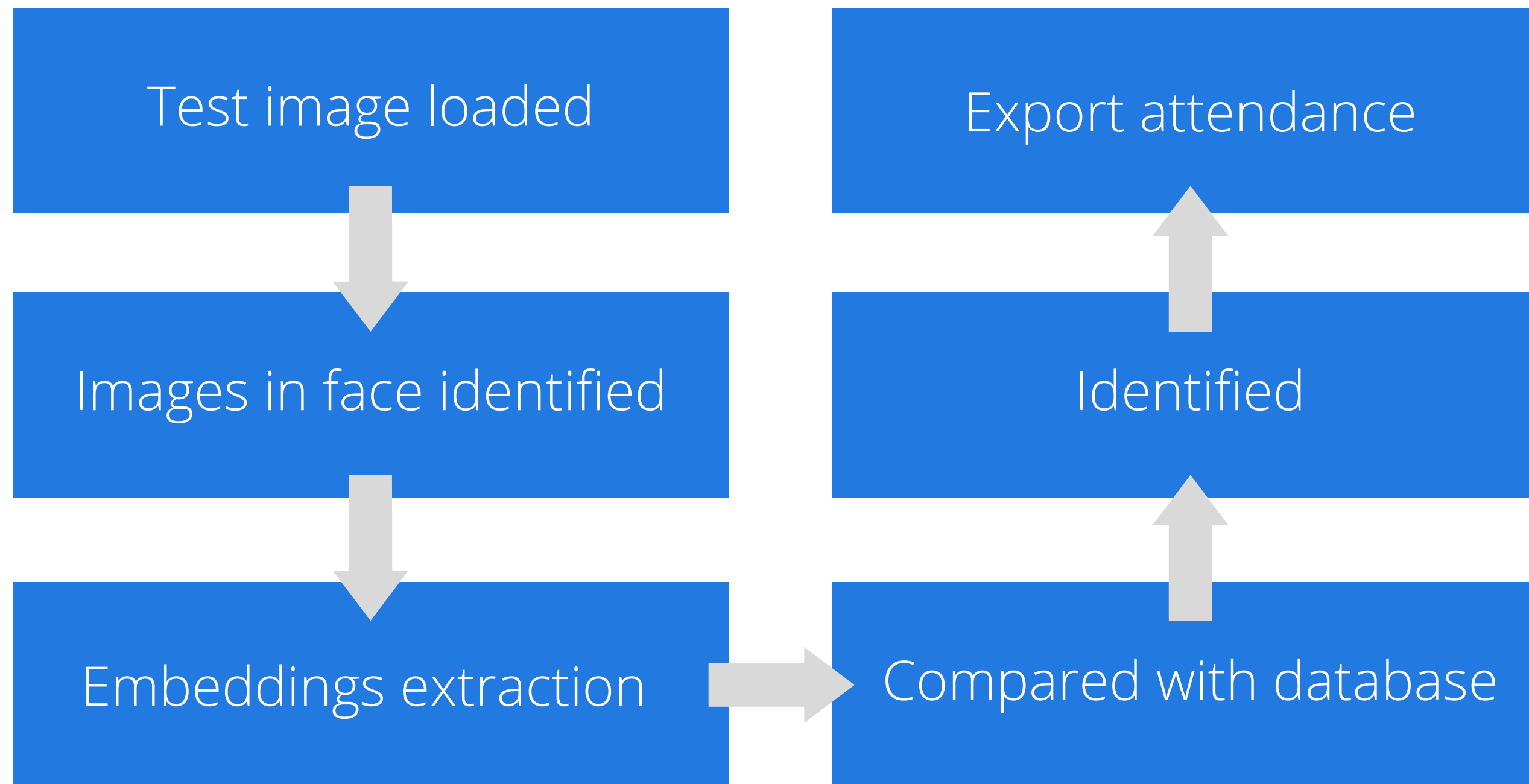
Block Diagram

Training phase



Block Diagram

Testing

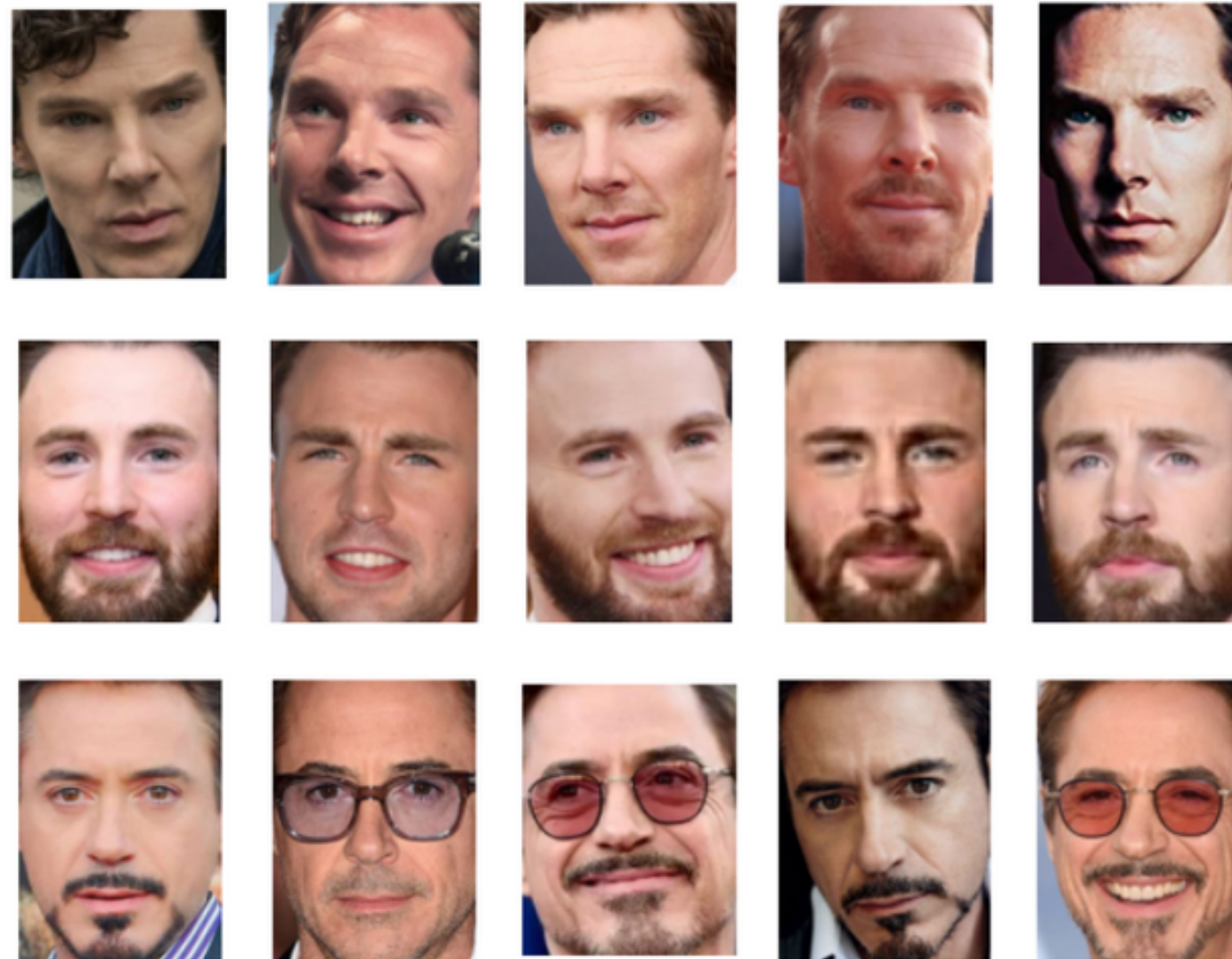


Methodology

- Training
 - Collect images
 - Face Recognition using MTCNN
 - Cropping of face
 - Embeddings using FaceNet
- Testing
 - Test image loaded
 - Images in face identified
 - Embeddings extracted for test image faces
 - Compared with database for similarity
 - Identified
 - Export attendance by validation of members in the image

Inference

Sample Training Images:

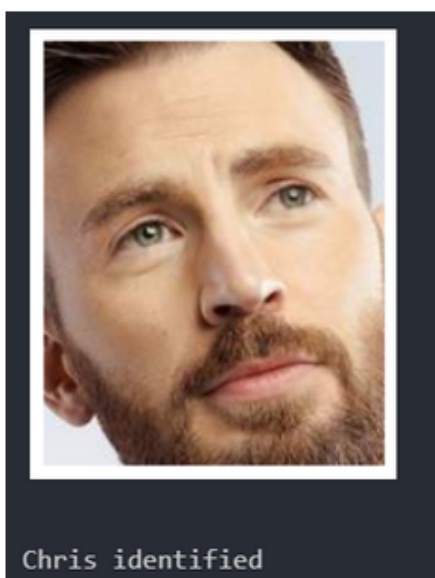


Inference

Test image:



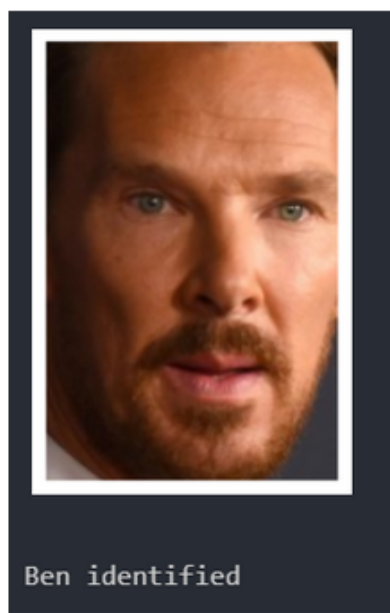
Output:



Test image:



Output:



Test image:



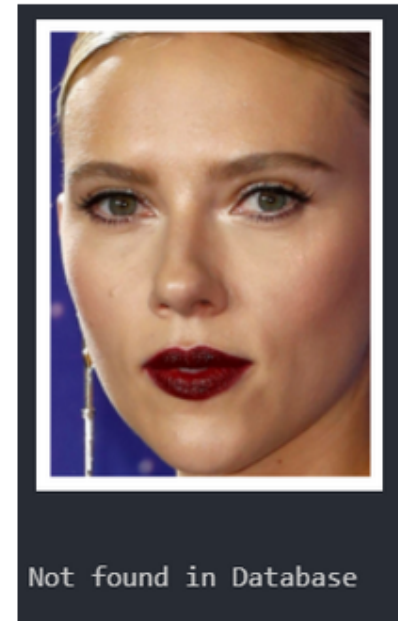
Output:



Test image:



Output:



Test image:



Output:



Conclusion

- Thus we can see that the python script can perform facial recognition and detection which is in turn implemented for attendance validation. Test images have been used to estimate its performance and the script has been able to correctly identify the users as expected by using embeddings extracted by FaceNet.
- The above algorithm can either be loaded onto a microprocessor like Raspberry Pi for onboard processing or can be loaded to a remote server that can fetch the images from a classroom's CCTV footage to do the processing off-board. It can also be implemented as an Android app that can be used by Teachers and Employers to maintain attendance.

Conclusion

- Implementation was also tested using a Raspberry Pi wherein the Pi was made to upload an image captured by an attached web camera to a cloud database and then this image was fetched by a computer system acting as a server for testing purposes and by running the script, attendance logging was validated.
- Thus we have implemented an Automatic Attendance System using Face Recognition in Python.
- GitHub link: https://github.com/sam189239/face_attendance

References

- [https://en.wikipedia.org/wiki/Python_\(programming_language\)](https://en.wikipedia.org/wiki/Python_(programming_language))
- <https://medium.com/@iselagradilla94/multi-task-cascaded-convolutional-networks-mtcnn-for-face-detection-and-facial-landmark-alignment-7c21e8007923>
- <https://www.geeksforgeeks.org/facenet-using-facial-recognition-system/>
- <https://en.wikipedia.org/wiki/OpenCV>



End of Report