



Facial Recognition based Attendance Taking System



TARC
TUNKU ABDUL RAHMAN
UNIVERSITY COLLEGE

Lee Yan Jie

BSC (Hons) in Software Engineering
Supervisor: Ms. Mazlinda binti Nezam Mudeen

Abstract

Facial Recognition System uses trained databases to recognize specific individual faceprints through video capturing and processing digital images. It is well known in the community and has been further developed to contribute to the society by reducing human's work. This project includes a deep study regarding current existing **attendance taking system** and **facial recognition**. A **research prototype** is developed to combine the facial recognition with attendance taking.

Problem Statement

Face recognition is not commonly used in the higher education of Malaysia. There are many **challenges faced** when implementing this technology, thus the **community neglects to accept** it. The **accuracy** of the software is not trustworthy and inconsistent. However, the current existing attendance system is **time consuming**, and unreliable. This is because the students seize the opportunity to fake their attendance when possible. It is difficult to implement facial recognition technology with the attendance taking system, due to the **lack of understanding** and the cost to develop is too **expensive**.

Objectives

1. To identify **challenges** that faced in facial recognition
2. To analyze **advantage and contribution** in software industry
3. To analyze potential **algorithms** for facial recognition
4. To develop a face recognition **prototype** to identify a person based on facial features
5. To validate the proposed face recognition prototype in terms of **accuracy and performance**

Design and Methodology

This prototype is mainly developed using a **laptop** under **Windows 11 Operating System**. The reason behind this is due to the need of running and training the deep learning faceprints dataset will **require hardware with high memory storage and processor**. However, the attendance system is expected to remain and work as usual as in the current TARC App, meaning students will take the attendance with their own phone.

The development platform used is **Visual Studio Code**, but **Command Prompt** is also used over time to install necessary **Python libraries**. Therefore, the Facial Recognition Prototype can be said to be 100% developed by **Python language**, where the UI is built using **Tkinter** and the database is maintained using **SQLite 3**.

Haar Cascade Classifier and **LBPH** are the Face Recognition algorithms to be used for this project. Although some other algorithms such as Fisher Face or HoG can also perform facial recognition, it is true that Haar Cascade has the best and most consistent performance among all.

The software process development model is **Prototyping** due to **limited manpower, budget and development time**. Not only that, the user requirement is quite uncertain, and this project should highly involve the user to participate. Also, the **project scope is relatively small** which focuses on only the attendance taking part, this makes Prototyping the most suitable model for this project.



Construction and Testing

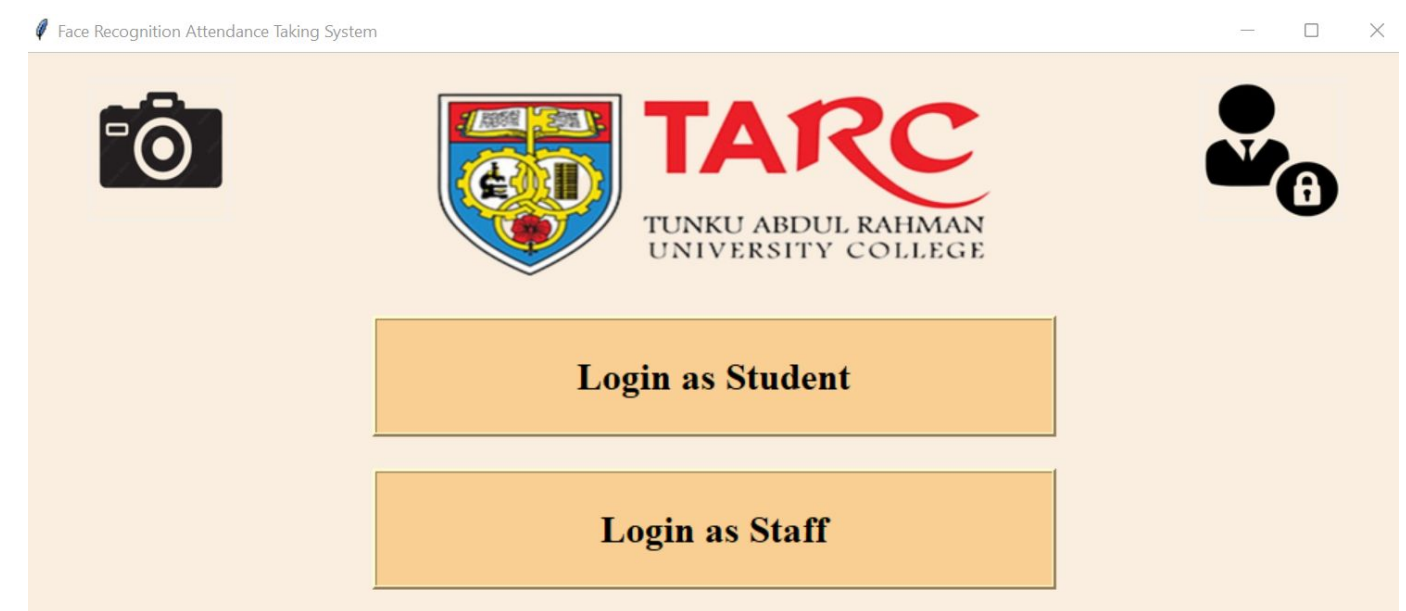


Figure 1: Homepage of the Attendance Taking System

Lack of understanding of facial recognition makes the process difficult, but through consultation with the supervisor, online research, and seeking help from professional lecturers have provided useful ideas. People neglect storing their faceprints in the database so it is not practical to find many test subjects for the database. Thus, my friends and family who were supportive, are willing to allocate time to provide training images. The time constraint is stressful, where time management and setting goals must take place to ensure the project is delivered on time.

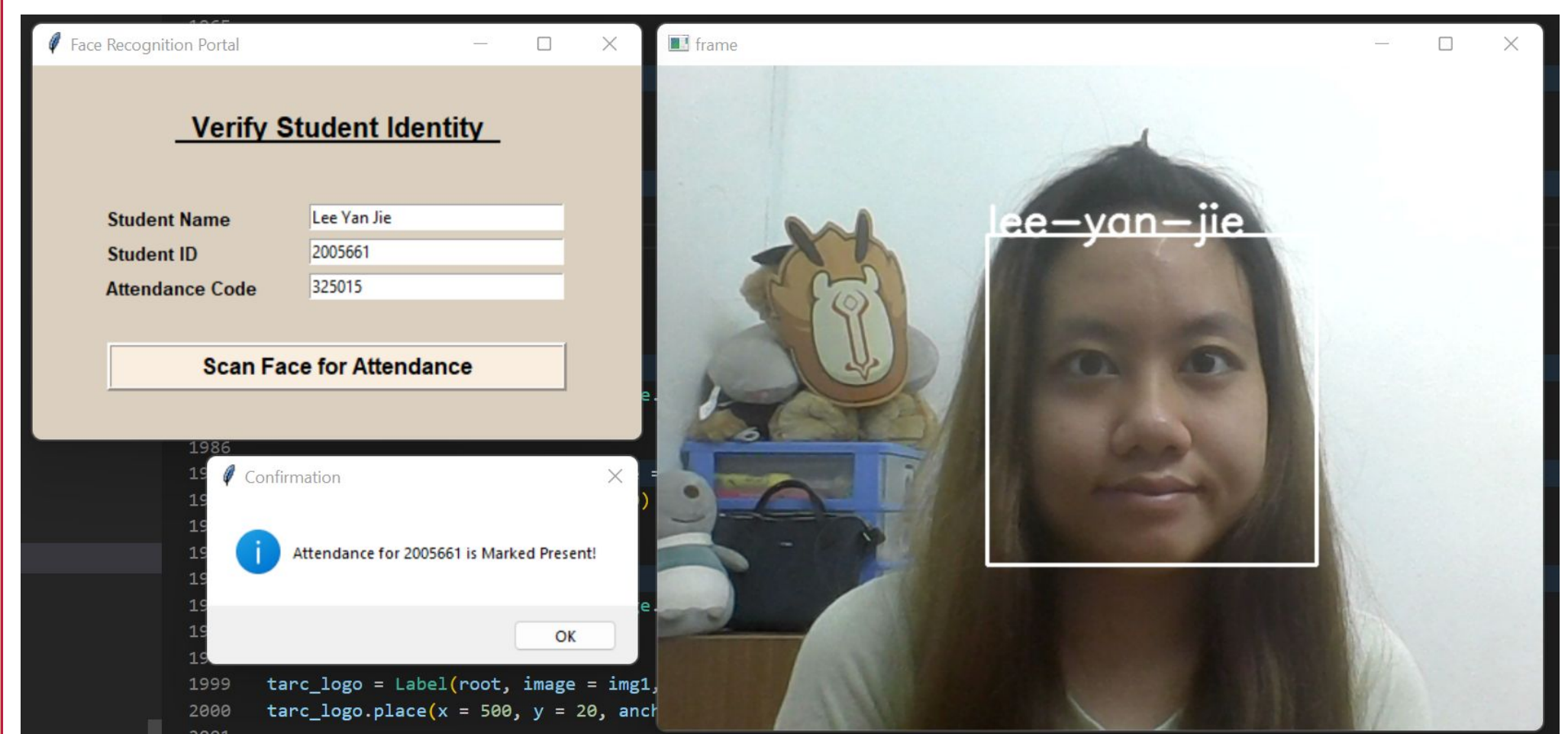


Figure 2: Attendance Taking by Facial Recognition

```
ret, frame = cap.read()
gray = cv2.cvtColor(frame, cv2.COLOR_BGR2GRAY)
faces = face_cascade.detectMultiScale(
    gray, scaleFactor = 1.05, minNeighbors = 6, minSize = (200, 200))

for (x, y, w, h) in faces:
    roi_gray = gray[y:y+h, x:x+w]
    cv2.rectangle(frame, (x, y), (x+w, y+h), (255, 0, 0), 2)

    # Save the Captured Image into the Datasets Folder
    img_item = (user_name.replace(" ", "_") + "_" + str(count) + ".jpg")

    cv2.imwrite(img_item, roi_gray)
    cv2.imshow('image', frame)
```

Figure 3: Algorithm Used to Capture Training Data

Contribution

Facial Recognition based Attendance Taking System contributes by:

1. Improving the **society's understanding and acceptance** towards the facial recognition technology.
2. **Advancing the process** of attendance taking by facial recognition.
3. Reducing **staff's workload** and enhance **student attendance rate**.

Conclusion

The **Facial Recognition based Attendance Taking System** is successfully developed and tested. This project has fulfilled the user requirements and satisfied all the objectives stated. During the project design stage, deep investigation is carried out to study different methodologies for implementation, a prototype is then created, where the 25 faceprints databases are collected for machine learning. Then, system testing is performed to validate the system functionality, to take students attendance, to allow staff to manage attendance, and to allow the admin to manage users.