Automated Virtual Attendance Using Image Recognition Techniques

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***Abstract* - The task of conducting routine attendance in an organisation or institution is a crucial as well as a tedious process. The accuracy and precision of the resultant process needs to be of superior quality. Thus, it orders to maintain adequate quality and thorough output, we rely on traditional manual attendance procedures of individual roll-calling.**

Certain advancements in the field of digitalisation and automation, techniques such as biometric fingerprint or face detection and identification, identity card punching and swapping have been introduced in order to handle the redundancy or attendance conduction.

However, these methods have many issues like students wasting time during attendance of subjects and going to the waiting queue. There are many situations in which people waste time and other issues created when any person loses their ID. Then he will not be able to mark his attendance, even though he is physically present.

Keywords*: - *Face Recognition, Face Detection, Image Capture, KNN, SVM.

Introduction

1.Objectives-The methodology proposed is designed to apply the features of current face detection algorithms. As the time is passing and research is going on there has been a lot of changes in face recognition algorithms and the other steps that are involved are face detection, feature extraction. Firstly, we need to capture the image for recognition and for that we will use multiple cameras to cover the entire area. The input for the system will be the images that were captured by the camera that we installed. Due to the movement of the students or due to defect in the lens of the camera the quality of the image can be compromised. In order to obtain better efficiency, images can be upgraded using Generative Adversarial Networks. For the face detection first, we will enhance the quality of image and refine it then we pass it to the system. Face recognition is done with the help of face detection and feature extraction. Feature extraction uses the Gabor filters. Face recognition is done using the KNN algorithm, Convolutional neural networks, and SVM algorithm. After the face recognition the system will produce the ID of the students present in the image using the database.so with the help of that Id the attendance will be marked for that lecture.

Scope

Every classroom has a huge number of attendees or students nowadays, which in turn makes the routine attendance a laborious and tedious task. The application of this technology and product will result in comparatively lesser time taken and human efforts involved.

This will also ensure the safe storage of an organisation's data as it intends to store the new entry made in a relational database, and they don't have any third party controlling their data.

With this, they can customise their search filters or security methods as the project is being built from scratch and nothing is prebuilt. The organisation or administration is given maximum authority over the database and deciding which predefined factors will allow or deny an individual's attendance.

Motivation

The process of automated attendance is generally implemented with the application of various biometrics tools and methods. Face recognition can improve the system of automated attendance system. It is the most productive way of taking attendance due to its property of being less time-consuming and involvement of third-party. A lot of research is going on to improve the face recognition algorithms.

As the mobile phone technology is improving and the security level of the fields are also growing, there is a rapid growth in this arena. It is a method of labelling a known face. As humans remember the face of the known people so we are trying to make the computers to remember the face of the owner and users.

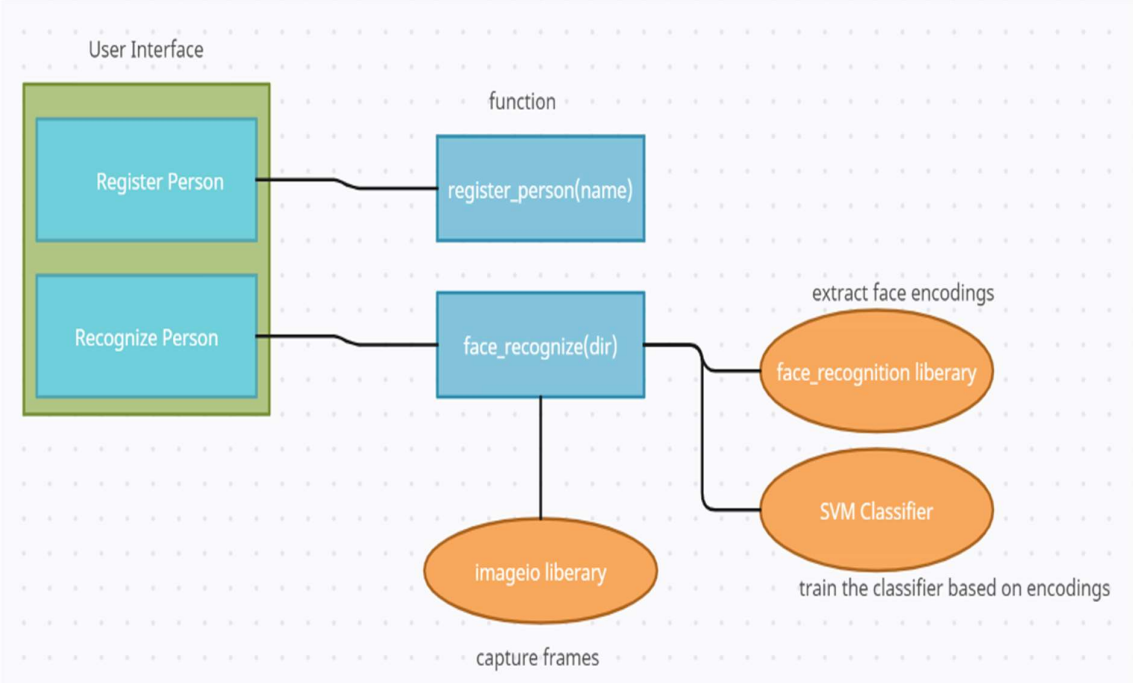
There are lots of applications of face recognition such as surveillance, social media. So that we can connect the known people and we can use surveillance for the security purpose

Methodology

1. Workflow-The methodology for this code can be broken down into the following steps:
2. Import necessary libraries-The code begins by importing the necessary libraries including face recognition, OpenCV, tkinter, and imageio.
3. Define GUI-The graphical user interface (GUI) is defined using tkinter to display the logo and text fields for entering names.
4. Define functions for face registration and recognition: Two functions are defined in the code: register_person() and face_recognize(). The register_person() function captures five images of a person's face using the computer's webcam and saves them in a directory with the person's name. The face_recognize() function loads the images saved in the directory and trains a Support Vector Machine (SVM) classifier using the face_recognition library. The classifier is then used to recognize faces in real-time using the webcam.
Define functions for registering and recognizing faces: Two functions are defined in the code: on_register() and on_recognize(). The on_register() function is called when the user clicks on the "Register" button in the GUI. It reads the name entered in the text field, and if the name is not empty, it calls the register_person() function to register the person's face. The on_recognize() function is called when the user clicks on the "Recognize" button in the GUI. It calls the face_recognize() function to recognize faces in real-time.

Run the GUI: The main loop of the GUI is run using the tkinter mainloop() function, which waits for user events such as button clicks.

Architecture



Results

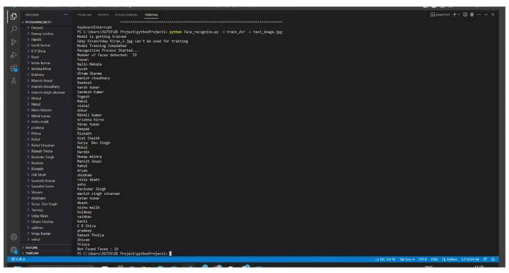
1. Experiment-1

In this experiment we have consider a image of 10 people and we produced the result with 100% accuracy, all people with their name were recognised.

2. Experiment-2

In this experiment we have consider a image of 30 people and we produced the result with 96.67% accuracy all people with their name were recognised.

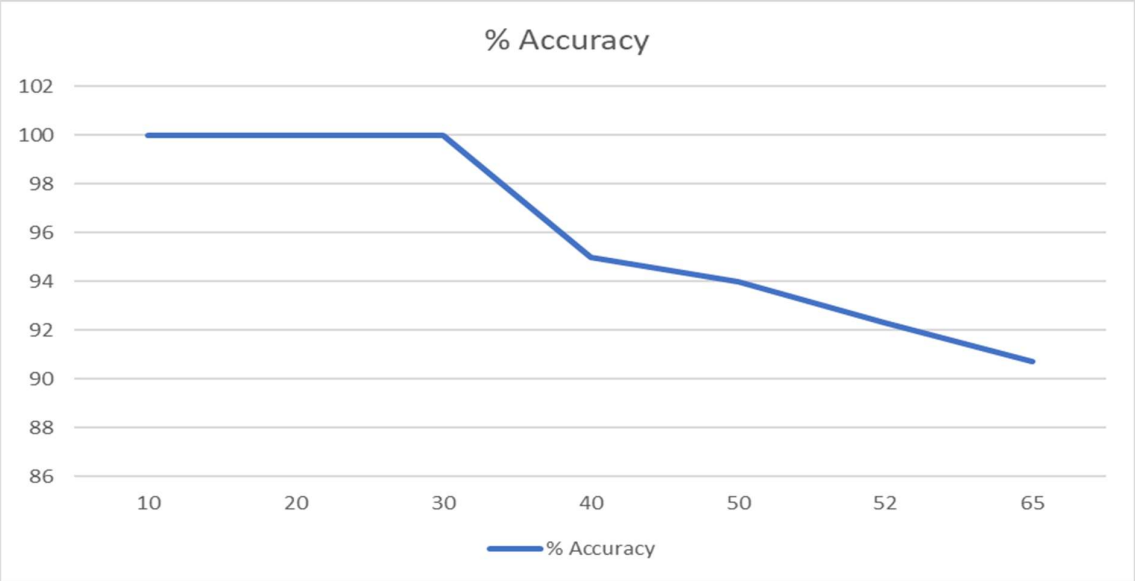
3. Experiment-3



In this experiment we have consider a image of 59 people and we produced the result with 93.22% accuracy all people with their name were recognised.

4. Performance

Total Faces	Face Detected	Correct Recognised	Face Detection Accuracy (%)	Correct Recognised Accuracy (%)
10	10	10	100%	100%
20	20	20	100%	100%
30	30	30	100%	100%
40	40	38	100%	95%
50	50	47	100%	94%
62	62	57	100%	91.9%
65	65	59	100%	90.7%



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