Image Attendance System

Overview

This program automates the process of attendance marking using facial recognition technology. It leverages OpenCV for image processing, face_recognition for face identification, and winsound to emit an alarm for unrecognized faces. The attendance records are systematically saved in a CSV file, with a new file generated for each day.

Prerequisites

- Python 3.9
- OpenCV (`cv2`)
- Numpy (`np`)
- face_recognition
- winsound (for windows)

To install the necessary libraries, execute the following command:

```
pip install opencv-python numpy face_recognition
```

Function Descriptions

Create_Attendance_File ()

This function creates a new CSV file named `Attendance_YYYY-MM-DD.csv`, where `YYYY-MM-DD` represents the current date. It initializes the file with headers `Name` and `Time`.

Returns:

- `filename` (str): The name of the newly created CSV file.

Mark_Attendance (name, filename)

This function appends a new entry to the specified attendance CSV file. Each entry consists of the person's name and the current time.

Parameters:

- `name` (str): The name of the individual.
- `filename` (str): The name of the attendance CSV file.

Load_Images(path)

This function loads images from a specified directory and extracts class names from the filenames. The images and corresponding class names are stored in separate lists.

Parameters:

- `path` (str): The directory path containing the images.

Returns:

- `images` (list): A list of loaded images.
- `class_names` (list): A list of class names corresponding to the images.

Encode_Images(Images)

This function encodes the given images using the face_recognition library to extract facial features. If no face is found in an image, a warning is printed.

Parameters:

- `images` (list): A list of images to be encoded.

Returns:

- `encode_list` (list): A list of encoded facial features.

Play_Alarm ()

This function emits an alarm sound using the winsound library. The alarm has a frequency of 2500 Hertz and a duration of 5000 milliseconds (adjustable)

Main Process

The `main` function orchestrates the workflow of the attendance system. The process includes initializing and loading data, capturing and processing video, recognizing faces, and marking attendance.

1. **Initialization and Data Loading:**
    - Creates a new attendance file for the current day using `create_attendance_file()`.
    - Loads images and class names from a specified directory using `load_images()`.
    - Encodes the loaded images using `encode_images()`.
2. **Video Capture and Processing:**
    - Opens a video capture stream from the webcam.
    - Continuously captures frames and processes them to detect and recognize faces.
3. **Face Recognition and Attendance Marking:**
    - For each detected face, it compares the face with known encoded faces.
    - If a match is found, the individual's name is marked in the attendance file using `mark_attendance()`.
    - If no match is found, an alarm is triggered using `play_alarm()`.
4. **User Interaction:**
    - Displays the webcam feed with rectangles around recognized faces and names.
    - Updates attendance records in real-time.
    - Ends the video capture and closes windows when the 'ESC' key is pressed.

Usage

Ensure you have a directory named `ImageAttendance` containing images of known individuals. The images should be named to reflect the individuals' names (e.g., `Emmanuel_Cheshi.jpg`).

To execute the script, run the following command in your terminal:

```
python attendance_system.py
```

Ensure that your webcam is functional and properly connected. The script will begin capturing video and processing faces to mark attendance.

Additional Notes

- The alarm functionality is specific to Windows systems due to the use of the `winsound` library.
- Ensure that the images used for recognition are clear and of high quality for improved accuracy.
- A new attendance file is created daily to maintain organized records.

By following this documentation, you should be able to understand the functionality, run the script, and modify the attendance system to suit your specific requirements.