

Drowsiness Detection Project: Documentation

1. Required Modules and Installation

To run this drowsiness detection project, you need the following Python libraries. Below are the commands to install them and a brief description of their purpose:

1. OpenCV (cv2)

- **Purpose:** Used for capturing video from a webcam, processing images, and detecting faces and eyes using pre-trained Haar Cascades.
- **Installation:**

```
pip install opencv-python
```

2. Imutils

- **Purpose:** Provides simple utility functions to work with image processing tasks like resizing and rotation.
- **Installation:**

```
pip install imutils
```

3. Pygame

- **Purpose:** Used for playing alarm sound when drowsiness is detected.
- **Installation:**

```
pip install pygame
```

4. Threading (part of Python's standard library)

- **Purpose:** Runs the alarm in the background without freezing the main video processing loop.
- **No installation required;** it's part of Python's built-in libraries.

2. Project Overview

The goal of this project is to create a system that detects when a person's eyes are closed for too long and plays an alarm if they remain closed, indicating potential drowsiness. The project uses OpenCV to capture video and detect the face and eyes using Haar Cascade Classifiers.

The basic workflow is as follows:

1. **Face Detection:** The program detects the face of the person in the video stream.
2. **Eye Detection:** Within the detected face, the program then detects the person's eyes.
3. **Drowsiness Detection:** If both eyes are detected as closed for a certain period, an alarm plays to alert the person.
4. **Real-Time Monitoring:** If the eyes open again, the alarm stops.

3. Running the Project

1. **Install all required libraries** as mentioned above.
2. Place the alarm sound file (alarm.mp3) in the appropriate directory.
3. Run the project script.
4. The system will monitor the video feed continuously. If drowsiness is detected, it will play the alarm until the eyes open again.

4. Important Considerations

- **Lighting Conditions:** Adequate lighting is important for accurate face and eye detection.
- **Positioning:** The person should face the camera for consistent eye detection.
- **Alarm File:** Ensure the alarm sound file is correctly loaded into the script.

This project can be used in scenarios where alertness is essential, such as monitoring drowsiness while driving or in other safety-critical environments.