User Manual: Motion Detection Security System

Overview: The Security Camera Application is a program that utilizes a camera feed to detect and record motion in real-time. It provides features such as motion detection, video recording, and a user interface for video viewing and management.

System Requirements:
- Operating System: Windows, MacOS, or Linux
- Python version 3
- Python tkinter library (comes preinstalled with Python)
- Python OpenCV library
  - To install: open command prompt (or terminal on MacOS) and write the command "pip install opencv-python"

Installation:
- Install the latest Python 3 version from the Python website (https://www.python.org/downloads/) and follow installation process to finish set up
- Install all relevant libraries (i.e. OpenCV) for image processing and motion detection
- Download and open the source code in a trusted Python interpreter (e.g. VSCode)

Executing the Application:
- Open the Python files containing the code and run the main.py file
- When the window titled "camera" pops up, the application will continue to run indefinitely until a face, which the application will track with a rectangle, is detected

- If no motion is detected for more than 5 seconds, the camera will stop recording and the "camera" window will close
- The recorded video will automatically be saved in the "recordings" folder
- To stop the video at any time, press the "q" key which will close the window and stop the application

User Interface:
The Motion Detection Application provides a user interface for additional functionality:
- Login: Users need to enter a username (woodroffe) and password (2023) to gain access to the other UI features

- Real-time video: Upon logging in, one of the options is the "real-time video" box which opens the video capturing device and allows the user to see what is being seen by the device in real-time

- View recordings: This button leads the user to the "recordings" folder where each video (formatted %d-%m-%Y-%H-%M-%S) is saved and available for viewing

- Clear recordings: The final option, the "clear recordings" button, displays a confirmation prompt before clearing the recordings to ensure that the user does not accidentally delete important videos

Troubleshooting:
- "Camera" window not opening: Ensure the camera is plugged in properly and has all the relevant software required to run. If issue persists, reboot the computer
- Motion detection not working properly/not detecting faces: Adjust the lighting to an adequate amount or change camera placement so that the camera for stronger results
- Libraries/Python not being recognized: Check if all relevant libraries (OpenCV) and Python itself are installed and compatible with each other. To do this:
    - Open command prompt (or terminal on MacOS) and type "python - - version". If Python is installed, the current version will show. If not, there will be an error message
    - Open command prompt (or terminal on MacOS), type "python", then press enter:
    - In the newly opened python interpreter, type the following command and continue to press enter after each line:
    - If OpenCV is installed, the current version installed will be displayed
    - If OpenCV is not installed, an error message will pop up. Therefore, to install the library, type the following command and press enter:
- Unable to view recordings: If there is an error opening the recordings folder, make sure:
    - The folder is in the same directory as the rest of the files
    - The name of the file where the recordings are stored is the same as what is written in the "user_interface.py" file

Known Limitations and Issues:
- Compatibility: The code works well with Python 3.x versions and an up to date OpenCV library. However, there may be large-scale issues with older versions of either Python or OpenCV. Ensure all the correct dependencies are installed and are up to date
- Lighting conditions: The full capability of this application relies greatly on decent lighting conditions. An environment with factors such as low-light, shadows, or abrupt changes may affect the accuracy of the application.
- Hardware Dependencies: The code assumes that a camera is connected to the computer, and it uses the default camera source (index 0 as seen with the "video_source" variable) for capturing frames. If there are multiple cameras or a different configuration with the camera(s), the code needs to be modified so the application can run smoothly. To do this, simply change the number linked with the "video_source" variable to the desired one:

Conclusion:

Using a video feed, the Security Camera Application offers a practical method for detecting and documenting motion. Real-time video, motion detection, recording, and a user interface for managing videos are among the capabilities it offers. The application can be properly installed and used to track and record motion by following the directions in this user manual.

For further assistance or any inquiries, please contact the application developers or refer to the project documentation.

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