Trespassing Detection System

Overview

This project implements a real-time trespassing detection system using OpenCV, YOLOv8, and motion detection. It analyzes video frames for motion and then applies YOLOv8 object detection to identify humans. If a human trespasser is detected, an alert email is sent.

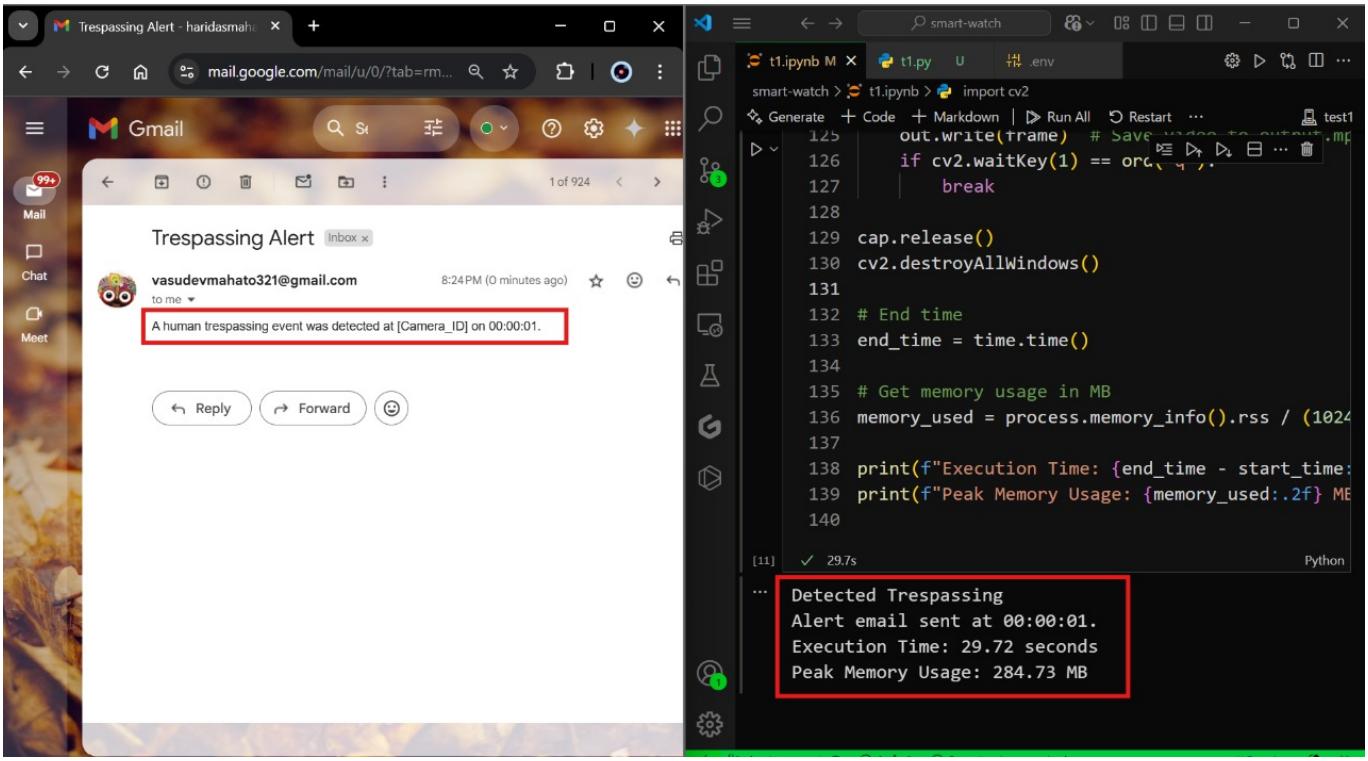
Components Used

- **OpenCV**: For video processing and motion detection
- **YOLOv8 (Nano)**: Lightweight deep-learning model for object detection
- **SMTP**: Used for sending email alerts

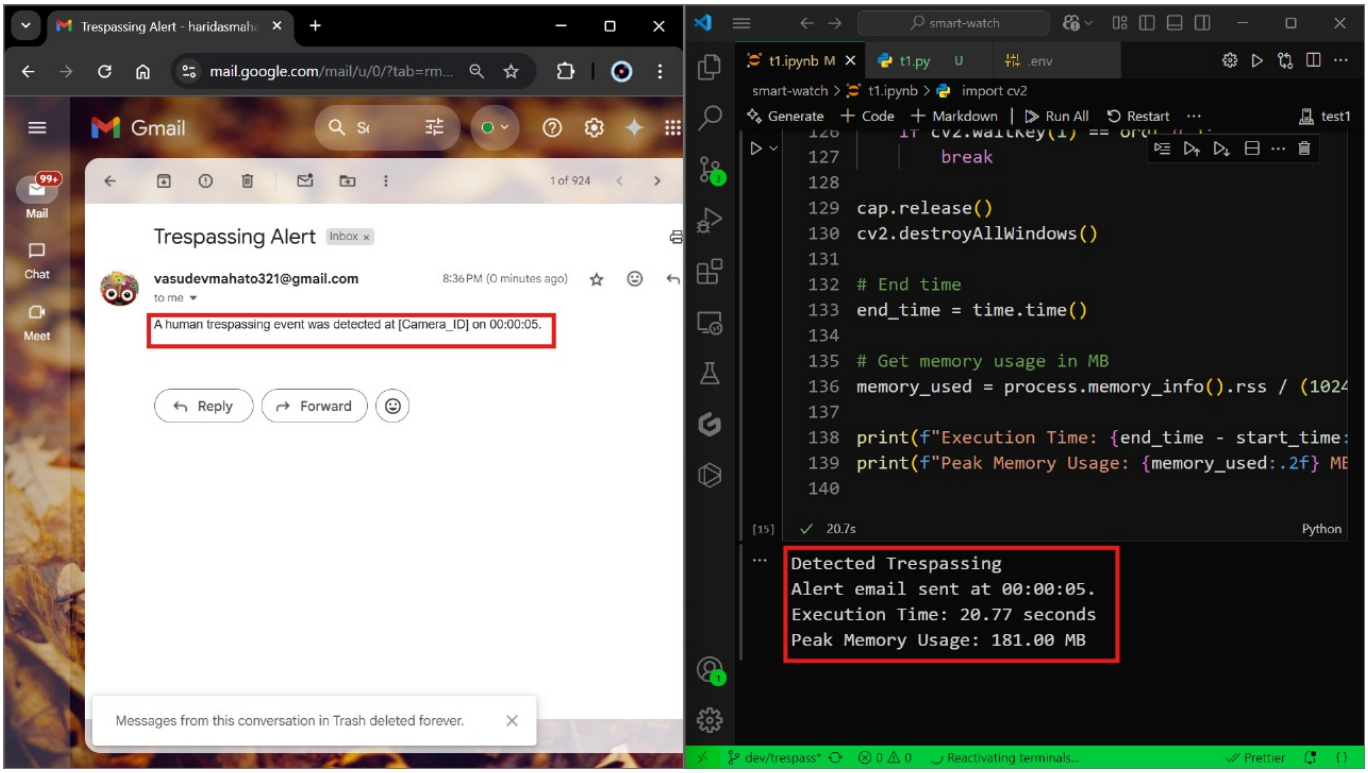
Process Flow

1. **Video Capture**: The system reads frames from the video feed.
2. **Motion Detection**:
    - A background subtractor detects motion.
    - If motion is detected, the system starts analyzing frames with YOLOv8.
3. **YOLOv8 Human Detection**:
    - The model processes frames to identify humans.
    - We are skipping a few frames to reduce the delay in human detection caused by YOLOv8.
    - Detects human in the frame for next 5 seconds.
    - If a human is detected with confidence ≥ 50%, a red bounding box is drawn.
4. **Email Alerts**:
    - If a human is detected and the predefined waiting period, which prevents multiple consecutive alerts in a short time, has elapsed, an email is sent.

Test 1 (Video Provided)



Test 2 (Our Video)



Key Features

- **Efficient Motion Detection**: Reduces unnecessary YOLOv8 computations.
- **Email Notifications**: Sends alerts when trespassing is detected.

Resource Requirements

- **Memory Usage**: The system requires approximately **200-300** MB of memory for smooth operation.

Conclusion

This project successfully detects human trespassing and sends alerts, making it useful for security applications. It balances efficiency with accuracy by combining motion detection and deep learning.