Project Overview: Live People Detection and Emotion Tracking

# Introduction

This project leverages real-time computer vision techniques to detect and track people and their emotions using a webcam feed. The project utilizes multiple open-source libraries such as Streamlit, OpenCV, Mediapipe, and FER (Facial Emotion Recognition) to perform real-time detection and analysis of human emotions and count the number of people in the frame.

# Technologies Used

1. Streamlit: Used for building a web application interface to display live video feed and interact with the system.  
2. OpenCV: Provides functionality for capturing video frames from the webcam and performing image processing.  
3. Mediapipe: A framework by Google for real-time computer vision tasks, used here to detect human pose landmarks and track people.  
4. FER: A library for detecting emotions from faces using deep learning models.

# How It Works

1. Live Video Capture: The system continuously captures video frames from the webcam using OpenCV.  
2. People Detection: Using Mediapipe Pose, the system tracks people in the video by detecting human body landmarks. Each detected pose corresponds to one person, and their count is updated in real time.  
3. Emotion Detection: FER is employed to detect the emotions of the people in the video based on their faces. The model analyzes each detected face and classifies it into different emotions (e.g., happy, sad, angry, etc.).  
4. Display: The detected emotions and the number of people in the frame are displayed on the video in real-time using OpenCV's cv2.putText() function. The processed frame is then shown in the Streamlit app.

# Features

1. Real-Time Detection: The app processes video frames continuously to detect people and emotions without any significant delay.  
2. Emotion Classification: Displays the most likely emotion for each face detected in the video feed.  
3. People Count: Tracks and displays the number of people present in the video frame.  
4. User Interaction: The app provides a button to start the detection process, and users can interact with the system seamlessly.

# How to Use

1. Install Dependencies:  
 To run the application, ensure all necessary libraries are installed:  
 pip install streamlit opencv-python-headless mediapipe fer  
2. Run the App:  
 After saving the Python script as app.py, run the following command to start the Streamlit app:  
 streamlit run app.py  
3. Start Detection:  
 - Click the 'Start Detection' button on the Streamlit interface to begin live detection of people and emotions.  
 - The webcam will start, and the app will begin processing frames in real-time, displaying both the number of people and their detected emotions.

# Challenges Faced

1. Real-Time Processing: Handling real-time video processing and ensuring the system does not freeze or lag.  
2. Emotion Detection Accuracy: Ensuring that the FER model provides accurate emotion classifications in different lighting and facial orientations.

# Future Enhancements

1. Multi-Face Emotion Detection: Enhance the emotion detection model to handle multiple faces simultaneously in a more complex environment.  
2. Person Tracking: Extend the system to track individual people across multiple frames.  
3. More Advanced Emotion Recognition Models: Implement more advanced models for better accuracy, especially for subtle emotions.