🧠 AI Assignment: Footfall Counter using Computer Vision

Objective

Develop a computer vision-based system that counts the number of people entering and exiting through a specific area (such as a doorway, corridor, or gate) in a video. The goal is to demonstrate your understanding of AI model integration, tracking logic, and end-to-end problem-solving.

Assignment Description

You are required to create a **footfall counter** that:

1. Detects humans in a video stream.

2. Tracks their movements frame by frame.

3. Defines a **virtual line or region of interest (ROI)**.

4. Counts how many people **enter** and **exit** by crossing the ROI.

You are **not provided with any dataset**. You may:

- Use any publicly available video (e.g., YouTube videos of crowds, offices, malls, or streets).

- Or record/simulate your own test video using a phone or webcam.

- Optionally use datasets like **MOT**, **COCO**, or **Open Images** for experimentation.

Core Requirements

Your solution should:

- Detect people in the video.

- Track individuals across frames.

- Define a line or zone for counting.

- Correctly count **entries** and **exits**.

- Display the count in real-time or after video processing.

Tools and Libraries (You may choose any)

- **Programming Language:** Python

- **Detection Models:** YOLO (any version), OpenCV DNN, or MediaPipe

- **Tracking:** SORT, DeepSORT, or custom logic using centroid tracking

- **Visualization:** OpenCV or Matplotlib

Expected Deliverables

1. **Code:**

   - A single Python script or Jupyter notebook containing the complete solution.

   - Use clear comments and modular code structure.

2. **README File:**
   Include:

   - A brief description of your approach

   - Video source used (link or description)

- ○ Explanation of counting logic

- ○ Dependencies and setup instructions

3. **Output:**

   - ○ Display a processed video or screenshots with bounding boxes and entry/exit counts overlaid.

   - ○ Print or display the final total count.

4. *(Optional but encouraged)*

   - ○ Provide a short demo video or GIF showing your solution in action.

Evaluation Criteria

Criteria	Weight	Description
Model Implementation	25%	Use of detection/tracking methods and correctness
Counting Logic	25%	Accurate entry/exit count based on ROI crossing
Code Quality	20%	Clean, modular, readable, and well-commented code
Performance & Robustness	15%	Handles multiple people, occlusions, or noise
Documentation & Presentation	15%	Clarity of README and visual output

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Bonus Points

- ● Real-time processing using webcam or RTSP stream

- ● Handling occlusions or overlapping people

- ● Visualizing heatmaps or trajectory paths

- ● Deploying a small API (Flask/FastAPI) that accepts a video and returns counts

Submission Guidelines

- Submit a compressed `.zip` or `.rar` file containing:

    - Code

    - README file

    - Example output (image/video or link)

- Do **not** include large datasets or pretrained model weights — instead, mention installation or download instructions.

- Ensure the code can run on a local machine with Python ≥ 3.8.

Time Limit

🕐 **Submission Window:** 7 working days from the time you receive this assignment.
If you need additional time for setup or data sourcing, mention it in your submission email.

Submission Format

Email Subject: AI Assignment — Footfall Counter — [Your Name]
Create a github repo.