

PEOPLE COUNTING AND TRACKING SYSTEM

1. INTRODUCTION

- **Overview**

In this project, we will build a “people counting and tracking system” with OpenCV and Python. Using OpenCV, we’ll count the number of people who are heading “in” or “out” of any department store in real-time.

- **Purpose**

When we apply object detection we are determining *where* in an image/frame an object is. An object detector is also typically more computationally expensive, and therefore slower, than an object tracking algorithm. Examples of object detection algorithms include Haar cascades, HOG + Linear SVM, and deep learning-based object detectors such as Faster R-CNNs, YOLO, and Single Shot Detectors (SSDs).

An object tracker, on the other hand, will accept the input (x, y) -coordinates of where an object is in an image and will assign a unique id to that particular object and track the object as it moves around a video stream, *predicting* the new object location in the next frame based on various attributes of the frame (gradient, optical flow, etc.)

2. OBJECT DETECTION AND TRACKING

- **Phase 1 (Detection)**

During the detection phase we are running our computationally more expensive object tracker to (1) detect if new objects have entered our view, and (2) see if we can find objects that were “lost” during the tracking phase. For each detected object we create or update an object tracker with the new bounding box coordinates. Since our object detector is more computationally expensive we only run this phase once every N frames.

- **Phase 2 (Tracking)**

When we are not in the “detecting” phase we are in the “tracking” phase. For each of our detected objects, we create an object tracker to track the object as it moves around the frame. Our object tracker should be faster and more efficient than the object detector. We’ll continue tracking until we’ve reached the N -th frame and then re-run our object detector. The entire process then repeats.

3. RESULT



4. APPLICATIONS

Many different types of businesses and activities find it useful to count and track people: smart cities, shopping centres, retail chains, museums, other public buildings, sporting venues, exhibition centres, theme parks, banks, hotels, buses, trains, restaurants and so on. The video people count data lets them make informed decisions about their business.

5. CONCLUSION

This is a very basic people counting and tracking project with the help of which we can keep a count of and track people. In this project, we also learned about object detection algorithms like Haar cascades, HOG + Linear SVM, and deep learning-based object detectors such as Faster R-CNNs, YOLO, and Single Shot Detectors (SSDs). People counting and tracking systems like this are being used in many commercial and non-commercial areas, and with the rise of technology, the use of such systems is just going to increase.

6. FUTURE SCOPE

People counters are used to measure different business metrics. While there are many different types of people counters and each model varies in the metrics supported, most people counters will offer some or all of the following metrics.

- Footfall
- Conversion Rate
- Visit Duration
- Bubble map / Heat map
- Zone counting / Traffic flow
- Outside traffic
- Returning customers