

# HUMAN DETECTION AND COUNTING USING PYTHON

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**Abstract** – Counting people in visual surveillance is hard and challenging problem. Automatic counting surveillance of individuals publicly areas is vital for safety control. Previously many techniques and methods are proposed.

These methods/techniques aren't producing accurate and high performance for difficult situations. Now Foreground Extraction and Expectation Maximization (EM) based methods are proposed, which provides a far better accurate solution for counting people and locating a private . This work presents the security precaution of covid-19 for maintaining social distancing. Single shot detector algorithm(SSD) takes the live stream from camera and convolutional neural network(CNN) will identify the human and assign a private id and therefore the count it accordingly. Keywords: Single shot detector(SSD) Algorithm, Deep Learning, Machine Learning, Convolutional neural network(CNN) Algorithm, Live stream

## 1. INTRODUCTION

In this python project, we are getting to build the Human Detection and Counting System through Webcam otherwise you can give your own video or images. this is often an intermediate level deep learning project on computer vision, which can assist you to master the concepts and cause you to an expert within the field of knowledge Science. Let's build an exciting project.

### 1.1 LITERATURE REVIEW

Anuj Mohan, Constantine Papageorgiou, and Tomaso Poggio [4] proposed a general example-based framework for detecting objects in static images by components. The technique is demonstrated by developing a system that locates people in cluttered scenes. Especially, the system detects the components of a person's body in a picture, i.e., the head, the left and right arms, and therefore the legs, rather than the complete body by using four distinct example based detectors. The system then checks to make sure that the detected components are within the proper geometric configuration.

### 1.2 Failures of Human Detection Previous Days

Facial Recognition Failure in China Back in November 2018, Chinese police admitted to wrongly shaming a billionaire businesswoman after a face recognition system designed to catch jaywalkers 'caught' her on a billboard on a passing bus. Traffic police in major Chinese cities deploy smart cameras that use face recognition techniques to detect jaywalkers, whose names and faces then show abreast of a public monitor. After this went viral on Chinese social media, a Cloud Walk researcher stated that the algorithm's lack of live detection could be the matter.

### 1.3 Pitfalls Faced by Authors:

1. Every problem needs an AI/ML solution.
2. The excitement has led to high expectations.
3. Blind chase after accuracy is needless.
4. Models don't fare well with rushed timelines.
5. Last-minute changes are hard to accommodate.
6. ML models should stay future-ready with none maintenance.

### 1.4 INNOVATIVENESS

1. The first aim is to use the project as a business perspective, able to scale.
2. Use case: counting the amount of individuals within the stores/buildings/shopping malls etc., in real-time.
3. Sending an aware of the staff if the people are over the limit.
4. Automating features and optimizing the real-time stream for better performance (with threading).
5. Acts as a measure towards footfall analysis and during a thanks-to tackle-COVID-19.
6. Real-Time-alert: we send an email alert in real-time. Use case: If the entire number of individuals (say 10 or 30) exceeded during a store/building, we simply alert the staff.
7. Multi-Threading is implemented in 'mylib/thread.py'. If you ever see a lag/delay in your real-time stream, think about-using it.
8. Threading removes OpenCV's internal buffer (which basically stores the new frames yet to be processed until your system processes the old frames) and thus reduces the-lag/increases-fps.

9. Automatic scheduler to start out the software. Configure to run at every second, minute, day, or Monday to Friday.
10. Configure stopping the software after a particular time, e.g., 30 min or 9 hours from now.

## 2. TECHNOLOGIES

| TECHNOLOGIES UTILIZED IN THE HUMAN DETECTION |  |
|--|--|
| Software Tools                               | Python (3.9), Open CV, CMake, Open CV Contrib, Visual Studio |

### 2.1 COMPONENTS CONTRIBUTION:

#### 1. VisualStudio:

simpler to develop C++ projects built with CMake without the necessity to get VS projects and solutions from the instruction.

#### 2. CMake:

CMake is cross-platform free and open-source software for build automation, testing and packaging employing a compiler-independent method.

#### 3. OpenCV:

OpenCV is that the huge open-source library for the pc vision, machine learning, and image processing and now it plays a serious role in real-time processing.

#### 4. OpenCV-Contrib:

Machine learning tasks which also supports Tensorflow, Torch/Pytorch and Caffe. one can process images and videos to spot objects, faces, or maybe handwriting of a person's

### 2.2 CAFFEMODEL

Caffe may be a deep learning framework developed by the Berkeley Vision and Learning Center (BVLC). it's written in C++ and has Python and Matlab bindings. There are 4 steps in training a CNN using Caffe: ... After training the model, we'll get the trained model during a file with extension caffemodel.

### 2.3 SINGLE SHOT DETECTOR (SSD)

SSD may be a single-shot detector. It no delegated region proposal network and predicts the boundary boxes and therefore the classes directly from feature maps in one single pass. To enhance accuracy, SSD introduces: small convolutional filters to predict object classes and offsets

to default boundary boxes. SSD is meant for object detection in real-time. Faster R-CNN uses a neighborhood proposal network to make boundary boxes and utilizes those boxes to classify objects. While it's considered the start-of-the-art in accuracy, the entire process runs at 7 frames per second. Far below what real-time operation needs. SSD accelerates the method by eliminating the necessity for the region proposal network. To recover the drop by accuracy, SSD applies a couple of improvements including multi-scale features and default boxes. These improvements allow SSD to match the Faster R-CNN's accuracy using lower resolution images, which further pushes the speed higher. Consistent with the subsequent comparison, it achieves the real-time operation speed and even beats the accuracy of the Faster R-CNN. (Accuracy is measured because the mean average precision map: the precision of the predictions.)

### 3. Convolutional Neural Network

1. First, we take a picture, video, Live CCTV cameras input.
2. Then we divide the image into various regions.
3. We'll then consider each region as a separate image.
4. Pass of these regions (images) to the CNN and classify them into various classes.
5. Once we've divided each region into its corresponding class, we will combine of these regions to urge the first image with the detected objects.
6. The matter with using this approach is that the objects within the image can have different aspect ratios and spatial locations. as an example, in some cases the thing could be covering most of the image, while in others the thing might only be covering a little percentage of the image. The shapes of the objects may additionally vary (happens tons in real-life use cases)

### 4. IMPACT OF HUMAN DETECTION AND COUNTING

During this COVID-19 situation, we should always maintain equal social distance and to possess a limited number of individuals in each place. to take care of these within the public places like shopping malls, theatre, complexes and lots of other crowded places where entrance and exit should get on an equivalent side. The Prediction border will count the entire number of in and total number of individuals out by assigning the individual identity number. If the people inside the place is exceeded the limit given within the admin system.

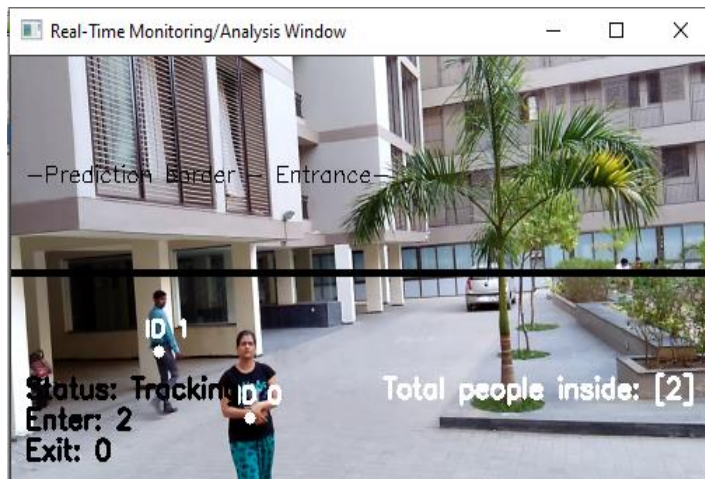
Then it'll gives an alert through mail by saying "Limit Exceeded within-the building". This project are going to be most useful during this COVID-19 pandemic situation.

**5. Applications**

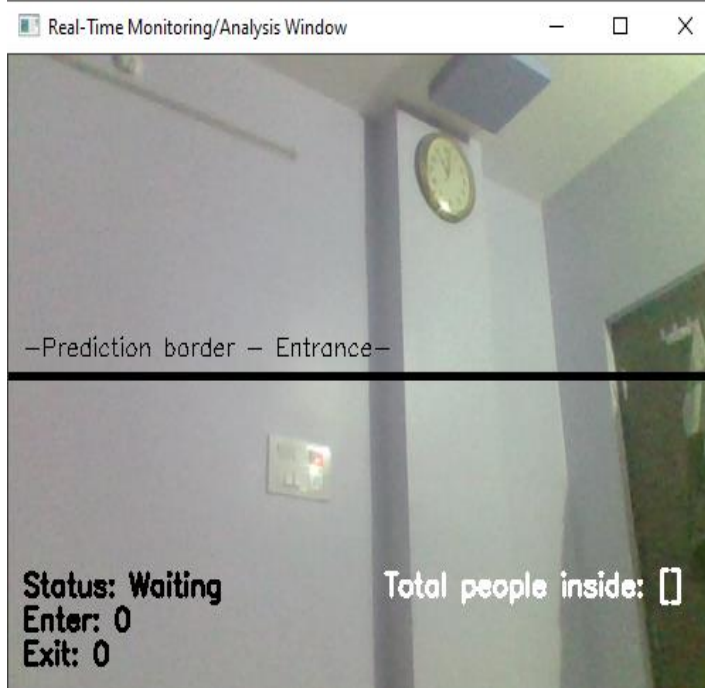
Detecting citizenry accurately during a visual closed-circuit television is crucial for diverse application areas including abnormal event detection, human gait characterization, congestion analysis, person identification, gender classification and fall detection for elderly people.

**6. SOME OF PROJECT WORK IMAGES**

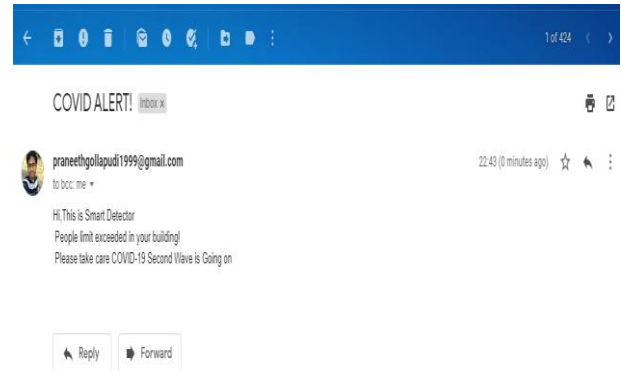
**Video Footage**



**Live CCTV Footage**



**Email Alert by the System**



**7. ADVANTAGES AND DISADVANTAGES**

| ADVANTAGES   | DISADVANTAGES   |
|--|---|
| 1. Makes implementation super easy   | 1. Highly coding difficult.                             |
| 2. Provides continuous surveillance.   | 2. Not useful in airports, railway station, bus stands. |
| 3. It is a very efficient way of delivering alerts to admin.                               | 3. Cannot operate from other places.                    |
| 4. As you have access to the net 24*7, you can train system anytime and from anywhere also | 4. Needs more memory to execute and communicate.        |

We overcome the drawbacks of the Human Detection and counting. We will give the long time access, conduct the live CCTV footage, videos.

**8. CONCLUSION**

The aim of this paper is to show that human detection and counting is most useful in this pandemic COVID-19 situation to maintain social distance in the public places by setting the people limit. So that we can easily monitor the people limit in this COVID situation.

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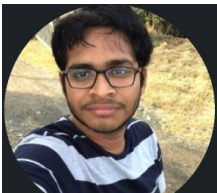
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