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Project Name: SOCIAL DISTANCING ALERT SYSTEM
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Project Title

SPS-3004-Social Distancing Alert System

Category

Deep Learning

Introduction

Project Idea:

COVID-19 spread is emotionally challenging for many people, changing day-to-day life in unprecedented ways. All sections of society should play a vital role to protect themselves and each other and help prevent further spread of the disease. Social-distancing is an important way to slow down the spread of infectious diseases. People are asked to limit their interactions with each other, reducing the chances of the disease being spread with physical or close contact.

Solution

The solution is to create a system that uses pre-installed cameras/ recorded videos to analyze images from public areas like shopping malls, streets to see whether the public is adhering to safety measures, like maintaining social distancing.

This project uses python combined with deep learning and computer vision to monitor social distancing. A web application is built and is hosted on the cloud which streams the video of Social distancing Violations

Tools and Technology Used

Deep learning is part of a broader family of machine learning methods based on artificial neural networks with representation learning.

Deep learning architectures such as deep neural networks, deep belief networks, recurrent neural networks and convolutional neural networks have been applied to fields including computer vision, machine vision, speech recognition, natural language processing, audio recognition, social network filtering

Artificial neural networks (ANNs) were inspired by information processing and distributed communication nodes in biological systems. ANNs have various differences from biological brains.

Specifically, neural networks tend to be static and symbolic, while the biological brain of most living organisms is dynamic (plastic) and analog. Most modern deep learning models are based on artificial neural networks,

specifically, Convolutional Neural Networks (CNN)s, although they can also include propositional formulas or latent variables organized layer-wise in

deep generative models such as the nodes in deep belief networks and deep Boltzmann machines
In deep learning, each level learns to transform its input data into a slightly more abstract and composite representation.
In an image recognition application, the raw input may be a matrix of pixels; the first representational layer may abstract the pixels and encode edges; the second layer may compose and encode arrangements of edges; the third layer may encode a nose and eyes; and the fourth layer may recognize that the image contains a face. Importantly, a deep learning process can learn which features to optimally place in which level *on its own*. (Of course, this does not completely eliminate the need for hand-tuning; for example, varying numbers of layers and layer sizes can provide different degrees of abstraction.)

Yolo Object Detection

The YOLO (You Only Look Once) real-time object detection algorithm, which is one of the most effective object detection algorithms.
Object detection is one of the classical problems in computer vision where you work to recognize *what* and *where* — specifically what objects are inside a given image and also where they are in the image. The problem of object detection is more complex than classification, which also can recognize objects but doesn't indicate where the object is located in the image. In addition, classification doesn't work on images containing more than one object.
YOLO uses a totally different approach. YOLO is a clever convolutional neural network (CNN) for doing object detection in real-time. The algorithm applies a single neural network to the full image, and then divides the image into regions and predicts bounding boxes and probabilities for each region. These bounding boxes are weighted by the predicted probabilities.

This model has a number of benefits over other object detection methods:

- YOLO is extremely fast
- YOLO sees the entire image during training and test time so it implicitly encodes contextual information about classes as well as their appearance.

- YOLO learns generalizable representations of objects so that when trained on natural images and tested on artwork, the algorithm outperforms other top detection methods.

Overview

Project Flow

1. Get the camera / Video Feed
2. Detect pedestrians in the frame using the Yolo pre-trained model
3. Localize the pedestrians in the frame
4. calculate the centroid of the pedestrians detected
5. Find the distance between Pedestrians
6. Draw rectangle bounding boxes around pedestrians who are very close
7. Count the number of bounding boxes which are very near
8. Display the count of Violations on the frame
9. Create a Flask application which streams the frames
10. Host Web app on IBM Cloud

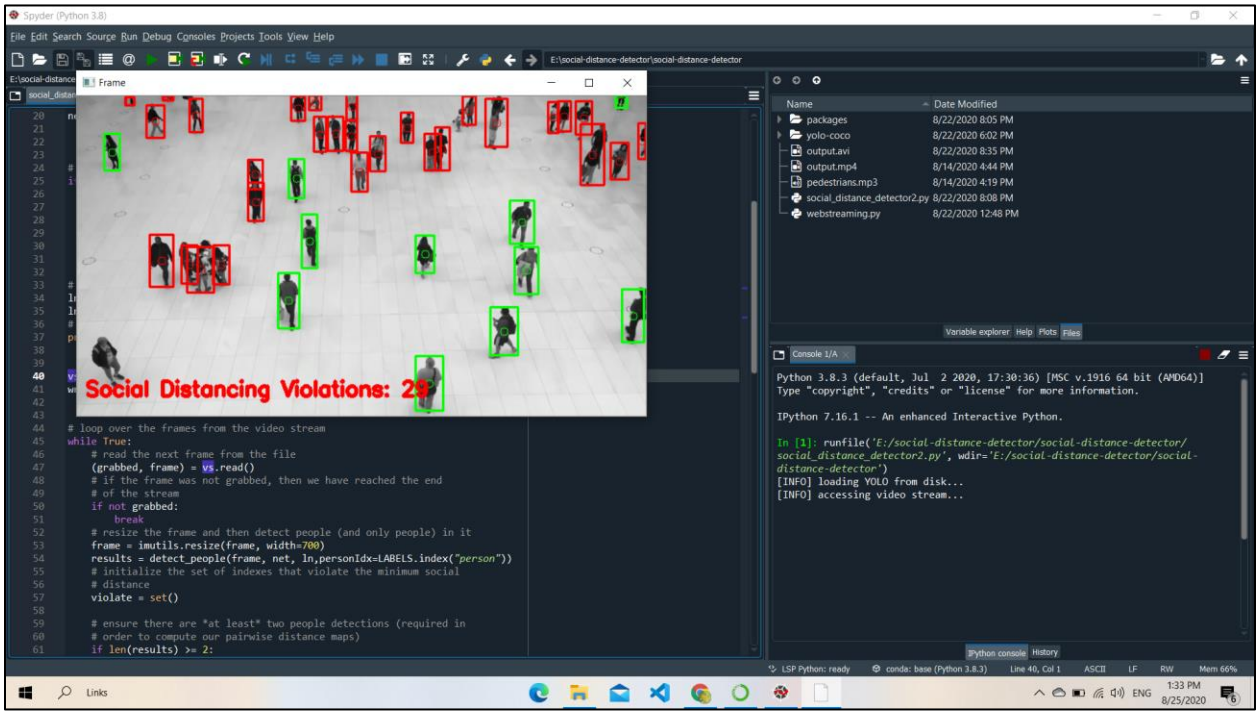
Purpose

In this project we have done with a Module which is able to detect the peoples those are violating the social distancing rule

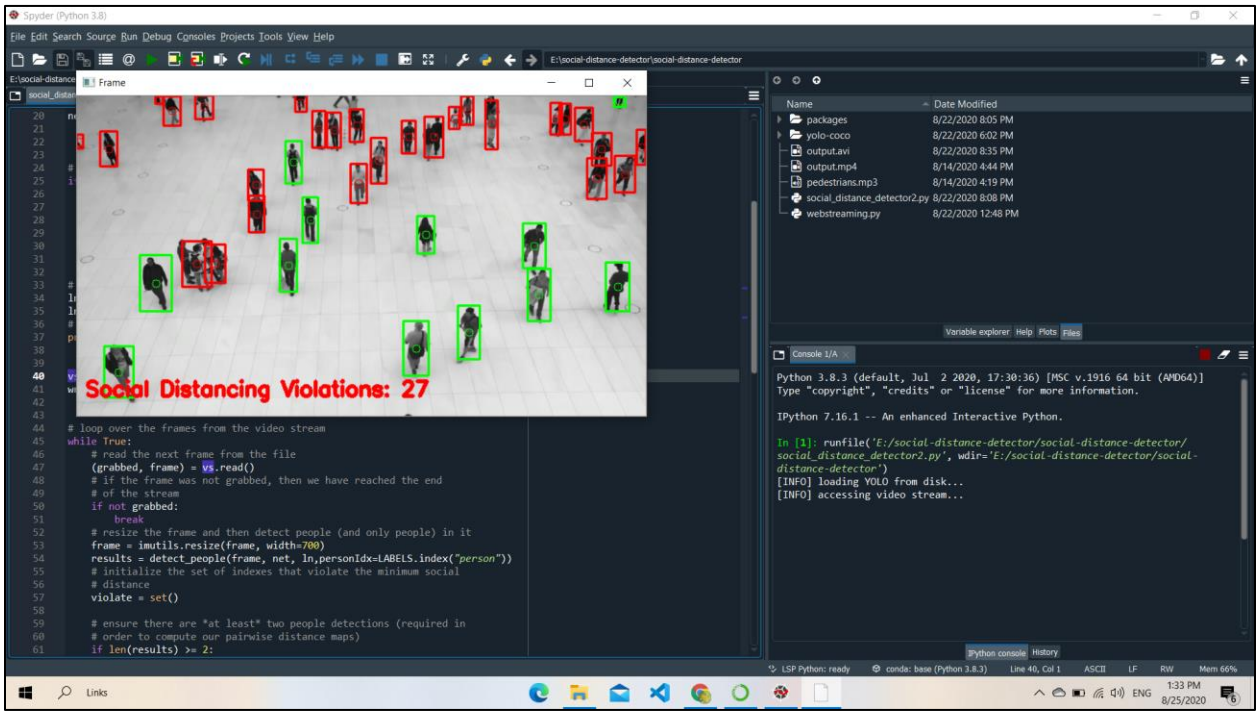
After Completing this project we should be able to

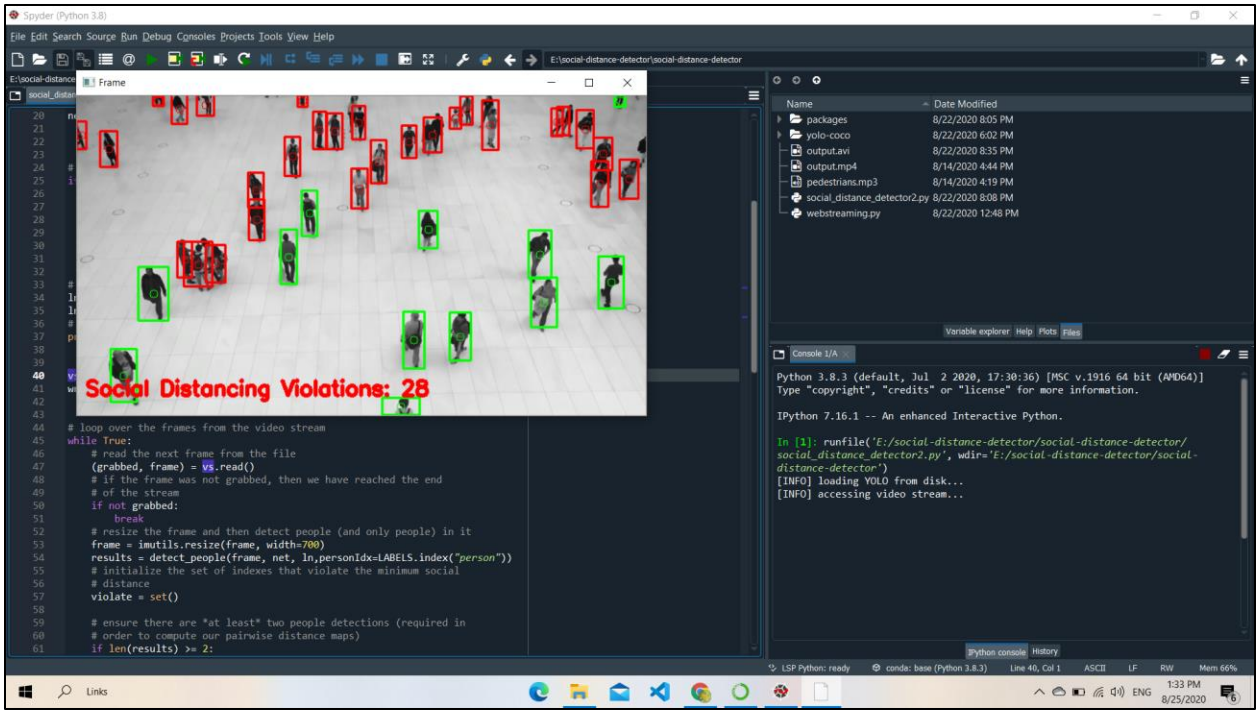
- Use Python, Deep learning and Computer vision concepts
- Yolo Object detection
- Flask Web Framework

Result

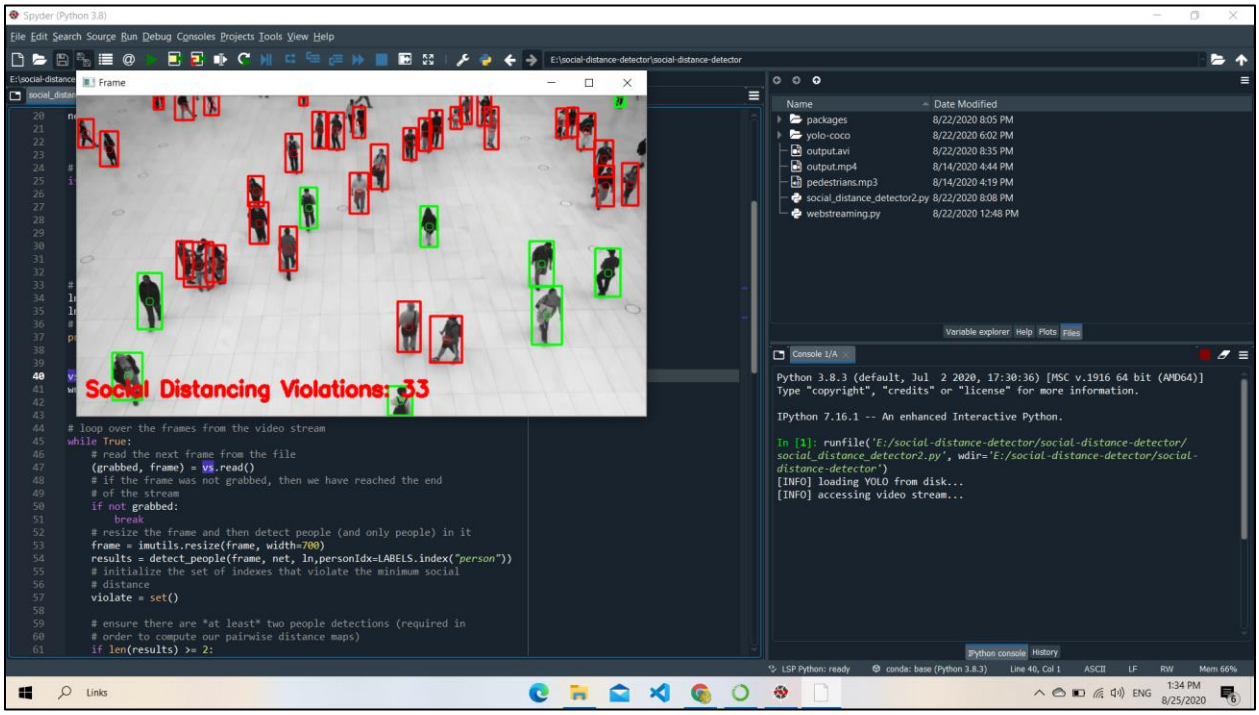


working of project





In this you can see the two people are getting closer.



In this you can see the two people are getting closer and the system detect the as violating the social distancing rule.

Application

a. It can be use in Mall.
b. It can be use in Cinram Theater.
c. It can be use in Public place such as Temple.
d. etc.

Conclusion

I have conclude that I have done the project named as Social Distancing Alert System under Guidance of SmartBridge Which is the online platform provide such guided project.

Future Scope

In Future this system can be useful in:

a. In Shopping mall.
b. in Hospital.
c. in Cinema Theater/ Multiplex.
d. Public place.