```
!pip install ultralytics==8.0.20
```

```
  Downloading sentry_sdk-1.30.0-py2.py3-none-any.whl (218 kB)
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Requirement already satisfied: oauthlib>=3.0.0 in /usr/local/lib/python3.10/dist-packages (from requests-oauthlib>=0.7.0->google
Installing collected packages: sentry-sdk, jedi, thop, ultralytics
Successfully installed jedi-0.19.0 sentry-sdk-1.30.0 thop-0.1.1.post2209072238 ultralytics-8.0.20
```

```
from IPython import display
display.clear_output()

from ultralytics import YOLO
from IPython.display import display, Image
```

```
from google.colab import drive
drive.mount('/content/drive')
```

```
Mounted at /content/drive
```

```
Image(filename='/content/drive/MyDrive/tiger.jpg', height=500)
```

```
import torch
import torch.nn as nn
import torch.nn.functional as F
import torchvision.transforms as transforms
import torch.optim as optim
import torchvision
from torch.utils.data import DataLoader, Dataset
from skimage import io, color
import pandas as pd
import os
from tqdm.notebook import tqdm
```

```
# Takes inputs with dims = (N, C, *)
# Gives outputs with dimes = (N, C, *)
class LocalResponseNormalization(nn.Module):
    def __init__(self, neighbourhood_length, normalisation_const_alpha, contrast_const_beta, noise_k):
        super(LocalResponseNormalization, self).__init__()
        self.nbd_len = neighbourhood_length
        self.alpha = normalisation_const_alpha
        self.beta = contrast_const_beta
        self.k = noise_k

    # The following is exactly what pytorch does under the hood as well. I only replicated it for my understanding :)
    def forward(self, x):
        # Lets validate if x is atleast 3 dimensional
        dim = x.dim()
        if dim < 3:
            raise ValueError("Expected tensor of atleast 3 dimensions, found only {}".format(dim))
        denom = x.pow(2).unsqueeze(1)
        if dim == 3:
            denom = F.pad(denom, (0, 0, self.nbd_len // 2, (self.nbd_len - 1) // 2))
            denom = F.avg_pool2d(denom, (self.nbd_len, 1), stride=1)
            denom = denom.squeeze(1)
        else:
            sizes = x.size()
            # The last two dimensions make up a single channel. The third dimension decides the number of channels
            # across which we will apply local response normalization.
            denom = denom.view(sizes[0], 1, sizes[1], sizes[2], -1)
            # The point is to pad in front and back of the channels across which we'll apply normalization
            denom = F.pad(denom, (0, 0, 0, 0, self.nbd_len // 2, (self.nbd_len - 1) // 2))
            denom = F.avg_pool3d(denom, (self.nbd_len, 1, 1), stride=1)
            denom = denom.squeeze(1).view(sizes)
        denom = denom.mul(self.alpha).add(self.k).pow(self.beta)
        return x.div(denom)
```

```
# Expects input tensor to be of dimensions (batch_size, 3, 224, 224)
class Alexnet(nn.Module):
    def __init__(self):
        super(Alexnet, self).__init__()
        self.conv1 = nn.Conv2d(in_channels=3, out_channels=96, kernel_size=11, stride=4, padding=2)
        self.conv2 = nn.Conv2d(in_channels=96, out_channels=256, kernel_size=5, stride=1, padding=2)
        self.conv3 = nn.Conv2d(in_channels=256, out_channels=384, kernel_size=3, stride=1, padding=1)
        self.conv4 = nn.Conv2d(in_channels=384, out_channels=384, kernel_size=3, stride=1, padding=1)
        self.conv5 = nn.Conv2d(in_channels=384, out_channels=256, kernel_size=3, stride=1, padding=1)
        self.fc1 = nn.Linear(in_features=256 * 6 * 6, out_features=4096)
        self.fc2 = nn.Linear(in_features=4096, out_features=4096)
        self.fc3 = nn.Linear(in_features=4096, out_features=10)
        self.max_pool = nn.MaxPool2d(kernel_size=3, stride=2)
        # This layer helps us avoid calculating output map size when feeding into a linear layer in PyTorch.
        self.adaptive_pool = nn.AdaptiveAvgPool2d(output_size=(6, 6))
        self.norm = LocalResponseNormalization(neighbourhood_length=5, normalisation_const_alpha=1e-4, contrast_const_beta=0.75, noise_k
        self.dropout = nn.Dropout()
```

```
    def forward(self, x):
        x = self.max_pool(self.norm(F.relu(self.conv1(x))))
        x = self.max_pool(self.norm(F.relu(self.conv2(x))))
        x = F.relu(self.conv3(x))
        x = F.relu(self.conv4(x))
        x = self.adaptive_pool(self.norm(F.relu(self.conv5(x))))
        x = torch.flatten(x, 1)
        x = F.relu(self.fc1(x))
        x = F.relu(self.fc2(x))
        x = self.dropout(x)
        x = self.fc3(x)
        return x
```

```
class SceneDataset(Dataset):
    def __init__(self, annotations_csv, root_dir, transform=None):
        self.annotations = pd.read_csv(annotations_csv)
        self.root_dir = root_dir
        self.transform = transform

    def __len__(self):
        return len(self.annotations)

    def __getitem__(self, index):
        img_path = os.path.join(self.root_dir, self.annotations.iloc[index, 0])
        image = io.imread(img_path)
        label = torch.tensor(int(self.annotations.iloc[index, 1]))
        if self.transform:
            image = self.transform(image)
        return [image, label]
```

```
def check_accuracy(loader, model):
    num_correct = 0
    num_samples = 0
    # Don't forget to toggle to eval mode!
    model.eval()

    with torch.no_grad():
        for data, targets in tqdm(loader):
            data = data.to(device)
            targets = targets.to(device)
            scores = model(data)
            _, predictions = scores.max(1)
            num_correct += (predictions == targets).sum()
            num_samples += predictions.size(0)
        print("Correct: {}, Total: {}, Accuracy: {}".format(num_correct, num_samples, int(num_correct) / int(num_samples)))
    # Don't forget to toggle back to model.train() since you're done with evaluation
    model.train()
```

```
!yolo task=detect mode=predict model=yolov8n.pt conf=0.25 source='images1.jpeg' save=true
```

```
Downloading https://github.com/ultralytics/assets/releases/download/v0.0.0/yolov8n.pt to yolov8n.pt...
100% 6.23M/6.23M [00:00<00:00, 12.4MB/s]

2023-09-12 14:11:17.336928: I tensorflow/core/platform/cpu_feature_guard.cc:182] This TensorFlow binary is optimized to use availabl
To enable the following instructions: AVX2 FMA, in other operations, rebuild TensorFlow with the appropriate compiler flags.
2023-09-12 14:11:18.627308: W tensorflow/compiler/tf2tensorrt/utils/py_utils.cc:38] TF-TRT Warning: Could not find TensorRT
Ultralytics YOLOv8.0.20 🚀 Python-3.10.12 torch-2.0.1+cu118 CPU
YOLOv8n summary (fused): 168 layers, 3151904 parameters, 0 gradients, 8.7 GFLOPs
Traceback (most recent call last):
  File "/usr/local/bin/yolo", line 8, in <module>
    sys.exit(entrypoint())
  File "/usr/local/lib/python3.10/dist-packages/ultralytics/yolo/cfg/__init__.py", line 249, in entrypoint
    getattr(model, mode)(verbose=True, **overrides)
  File "/usr/local/lib/python3.10/dist-packages/torch/utils/_contextlib.py", line 115, in decorate_context
    return func(*args, **kwargs)
  File "/usr/local/lib/python3.10/dist-packages/ultralytics/yolo/engine/model.py", line 146, in predict
    return self.predictor(source=source, stream=stream, verbose=verbose)
  File "/usr/local/lib/python3.10/dist-packages/torch/utils/_contextlib.py", line 115, in decorate_context
    return func(*args, **kwargs)
  File "/usr/local/lib/python3.10/dist-packages/ultralytics/yolo/engine/predictor.py", line 158, in __call__
    return list(self.stream_inference(source, model, verbose))  # merge list of Result into one
  File "/usr/local/lib/python3.10/dist-packages/ultralytics/yolo/engine/predictor.py", line 173, in stream_inference
    self.setup_source(source)
  File "/usr/local/lib/python3.10/dist-packages/ultralytics/yolo/engine/predictor.py", line 139, in setup_source
    self.dataset = LoadImages(source,
  File "/usr/local/lib/python3.10/dist-packages/ultralytics/yolo/data/dataloaders/stream_loaders.py", line 172, in __init__
    raise FileNotFoundError(f'{p} does not exist')
FileNotFoundError: /content/images1.jpeg does not exist
Sentry is attempting to send 2 pending events
Waiting up to 2 seconds
Press Ctrl-C to quit
```

```
Image(filename='/content/drive/MyDrive/tiger.jpg', height=500)
```

```
!yolo task=detect mode=predict model=yolov8n.pt conf=0.25 source='/content/drive/MyDrive/tiger.jpg' save=true
```

```
2023-09-12 14:13:34.086254: I tensorflow/core/platform/cpu_feature_guard.cc:182] This TensorFlow binary is optimized to use availat
To enable the following instructions: AVX2 FMA, in other operations, rebuild TensorFlow with the appropriate compiler flags.
2023-09-12 14:13:35.343340: W tensorflow/compiler/tf2tensorrt/utils/py_utils.cc:38] TF-TRT Warning: Could not find TensorRT
Ultralytics YOLOv8.0.20 🚀 Python-3.10.12 torch-2.0.1+cu118 CPU
YOLOv8n summary (fused): 168 layers, 3151904 parameters, 0 gradients, 8.7 GFLOPs
image 1/1 /content/drive/MyDrive/tiger.jpg: 416x640 1 dog, 375.0ms
Speed: 4.3ms pre-process, 375.0ms inference, 36.6ms postprocess per image at shape (1, 3, 640, 640)
Results saved to runs/detect/predict
```

```
Image(filename='/content/runs/detect/predict/tiger.jpg', height=500)
```

```
from IPython import display
display.clear_output()

from ultralytics import YOLO
from IPython.display import display, Image
```

```
!pip install ultralytics==8.0.20
```

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Requirement already satisfied: ultralytics==8.0.20 in /usr/local/lib/python3.10/dist-packages (8.0.20)
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Requirement already satisfied: networkx in /usr/local/lib/python3.10/dist-packages (from torch>=1.7.0->ultralytics==8.0.20) (3.1
Requirement already satisfied: jinja2 in /usr/local/lib/python3.10/dist-packages (from torch>=1.7.0->ultralytics==8.0.20) (3.1.2
Requirement already satisfied: triton==2.0.0 in /usr/local/lib/python3.10/dist-packages (from torch>=1.7.0->ultralytics==8.0.20)
Requirement already satisfied: cmake in /usr/local/lib/python3.10/dist-packages (from triton==2.0.0->torch>=1.7.0->ultralytics==
Requirement already satisfied: lit in /usr/local/lib/python3.10/dist-packages (from triton==2.0.0->torch>=1.7.0->ultralytics==8.
Requirement already satisfied: jedi>=0.16 in /usr/local/lib/python3.10/dist-packages (from ipython->ultralytics==8.0.20) (0.19.0
Requirement already satisfied: decorator in /usr/local/lib/python3.10/dist-packages (from ipython->ultralytics==8.0.20) (4.4.2)
Requirement already satisfied: pickleshare in /usr/local/lib/python3.10/dist-packages (from ipython->ultralytics==8.0.20) (0.7.5
Requirement already satisfied: traitlets>=4.2 in /usr/local/lib/python3.10/dist-packages (from ipython->ultralytics==8.0.20) (5.
Requirement already satisfied: prompt-toolkit!=3.0.0,!=3.0.1,<3.1.0,>=2.0.0 in /usr/local/lib/python3.10/dist-packages (from ipy
Requirement already satisfied: pygments in /usr/local/lib/python3.10/dist-packages (from ipython->ultralytics==8.0.20) (2.16.1)
Requirement already satisfied: backcall in /usr/local/lib/python3.10/dist-packages (from ipython->ultralytics==8.0.20) (0.2.0)
Requirement already satisfied: matplotlib-inline in /usr/local/lib/python3.10/dist-packages (from ipython->ultralytics==8.0.20)
Requirement already satisfied: pexpect>4.3 in /usr/local/lib/python3.10/dist-packages (from ipython->ultralytics==8.0.20) (4.8.0
```

```
!yolo task=detect mode=predict model=yolov8n.pt conf=0.25 source='/content/drive/MyDrive/tiger.jpg' save=true
```

```
2023-09-12 14:42:28.915561: I tensorflow/core/platform/cpu_feature_guard.cc:182] This TensorFlow binary is optimized to use availab
To enable the following instructions: AVX2 FMA, in other operations, rebuild TensorFlow with the appropriate compiler flags.
2023-09-12 14:42:30.038716: W tensorflow/compiler/tf2tensorrt/utils/py_utils.cc:38] TF-TRT Warning: Could not find TensorRT
Ultralytics YOLOv8.0.20 🚀 Python-3.10.12 torch-2.0.1+cu118 CPU
YOLOv8n summary (fused): 168 layers, 3151904 parameters, 0 gradients, 8.7 GFLOPs
image 1/1 /content/drive/MyDrive/tiger.jpg: 416x640 1 dog, 259.5ms
Speed: 2.4ms pre-process, 259.5ms inference, 2.2ms postprocess per image at shape (1, 3, 640, 640)
Results saved to runs/detect/predict3
```

```
Image(filename='runs/detect/predict3/tiger.jpg',height=500)
```

```
!yolo task=detect mode=predict model=yolov8n.pt conf=0.25 source='/content/drive/MyDrive/timepass/9991.jpg' save=true
```

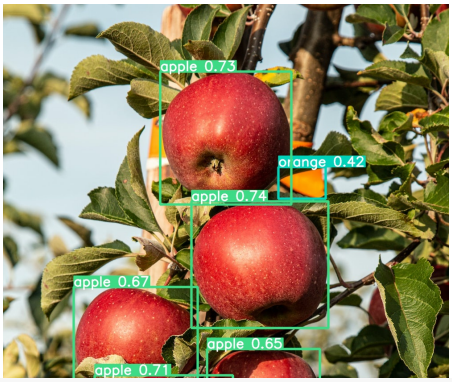
```
2023-09-12 14:48:05.068464: I tensorflow/core/platform/cpu_feature_guard.cc:182] This TensorFlow binary is optimized to use ava
To enable the following instructions: AVX2 FMA, in other operations, rebuild TensorFlow with the appropriate compiler flags.
2023-09-12 14:48:06.174909: W tensorflow/compiler/tf2tensorrt/utils/py_utils.cc:38] TF-TRT Warning: Could not find TensorRT
Ultralytics YOLOv8.0.20 🚀 Python-3.10.12 torch-2.0.1+cu118 CPU
YOLOv8n summary (fused): 168 layers, 3151904 parameters, 0 gradients, 8.7 GFLOPs
image 1/1 /content/drive/MyDrive/timepass/9991.jpg: 640x640 1 kite, 429.9ms
Speed: 3.2ms pre-process, 429.9ms inference, 2.4ms postprocess per image at shape (1, 3, 640, 640)
Results saved to runs/detect/predict4
```

```
Image(filename='runs/detect/predict4/9991.jpg',height=500)
```

```
!yolo task=detect mode=predict model=yolov8n.pt conf=0.25 source='/content/drive/MyDrive/timepass/photo-1576179635662-9d1983e97e1e.jpg'
```

```
2023-09-12 14:51:03.373675: I tensorflow/core/platform/cpu_feature_guard.cc:182] This TensorFlow binary is optimized to use availat
To enable the following instructions: AVX2 FMA, in other operations, rebuild TensorFlow with the appropriate compiler flags.
2023-09-12 14:51:04.488552: W tensorflow/compiler/tf2tensorrt/utils/py_utils.cc:38] TF-TRT Warning: Could not find TensorRT
Ultralytics YOLOv8.0.20 🚀 Python-3.10.12 torch-2.0.1+cu118 CPU
YOLOv8n summary (fused): 168 layers, 3151904 parameters, 0 gradients, 8.7 GFLOPs
image 1/1 /content/drive/MyDrive/timepass/photo-1576179635662-9d1983e97e1e.jpg: 640x448 7 apples, 2 oranges, 179.5ms
Speed: 2.4ms pre-process, 179.5ms inference, 5.3ms postprocess per image at shape (1, 3, 640, 640)
Results saved to runs/detect/predict5
```

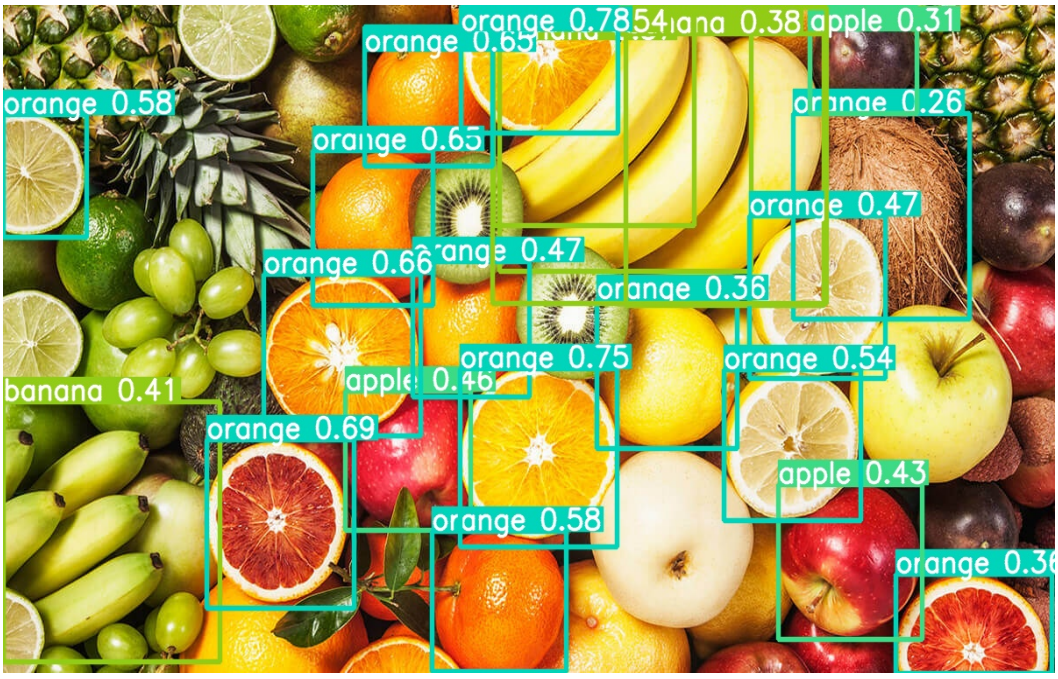
```
Image(filename='runs/detect/predict5/photo-1576179635662-9d1983e97e1e.jpg',height=500)
```




```
!yolo task=detect mode=predict model=yolov8n.pt conf=0.25 source='/content/drive/MyDrive/timepass/2-2-2-3foodgroups_fruits_detailfeat
```

```
2023-09-12 15:42:05.783935: I tensorflow/core/platform/cpu_feature_guard.cc:182] This TensorFlow binary is optimized to use availat
To enable the following instructions: AVX2 FMA, in other operations, rebuild TensorFlow with the appropriate compiler flags.
2023-09-12 15:42:07.016106: W tensorflow/compiler/tf2tensorrt/utils/py_utils.cc:38] TF-TRT Warning: Could not find TensorRT
Ultralytics YOLOv8.0.20 🚀 Python-3.10.12 torch-2.0.1+cu118 CPU
YOLOv8n summary (fused): 168 layers, 3151904 parameters, 0 gradients, 8.7 GFLOPs
image 1/1 /content/drive/MyDrive/timepass/2-2-2-3foodgroups_fruits_detailfeature.jpg: 384x640 5 bananas, 3 apples, 14 oranges, 177
Speed: 1.7ms pre-process, 177.7ms inference, 2.2ms postprocess per image at shape (1, 3, 640, 640)
Results saved to runs/detect/predict6
```

```
Image(filename='runs/detect/predict6/2-2-2-3foodgroups_fruits_detailfeature.jpg',height=500)
```




```
!yolo task=detect mode=predict model=yolov8n.pt conf=0.25 source='/content/drive/MyDrive/timepass/billabong-zoo-port-macquarie.jpg' save
```

```
2023-09-12 15:47:44.140397: I tensorflow/core/platform/cpu_feature_guard.cc:182] This TensorFlow binary is optimized to use availat
To enable the following instructions: AVX2 FMA, in other operations, rebuild TensorFlow with the appropriate compiler flags.
2023-09-12 15:47:45.265847: W tensorflow/compiler/tf2tensorrt/utils/py_utils.cc:38] TF-TRT Warning: Could not find TensorRT
Ultralytics YOLOv8.0.20 🚀 Python-3.10.12 torch-2.0.1+cu118 CPU
YOLOv8n summary (fused): 168 layers, 3151904 parameters, 0 gradients, 8.7 GFLOPs
image 1/1 /content/drive/MyDrive/timepass/billabong-zoo-port-macquarie.jpg: 480x640 4 dogs, 8 sheeps, 1 teddy bear, 203.6ms
Speed: 2.7ms pre-process, 203.6ms inference, 2.8ms postprocess per image at shape (1, 3, 640, 640)
Results saved to runs/detect/predict9
```

```
Image(filename='runs/detect/predict9/billabong-zoo-port-macquarie.jpg',height=500)
```


```
!yolo task=detect mode=predict model=yolov8n.pt conf=0.25 source='/content/drive/MyDrive/timepass/27-01-21_13-52-29.png' save=true
```

```
2023-09-12 15:55:44.081977: I tensorflow/core/platform/cpu_feature_guard.cc:182] This TensorFlow binary is optimized to use availab
To enable the following instructions: AVX2 FMA, in other operations, rebuild TensorFlow with the appropriate compiler flags.
2023-09-12 15:55:45.256091: W tensorflow/compiler/tf2tensorrt/utils/py_utils.cc:38] TF-TRT Warning: Could not find TensorRT
Ultralytics YOLOv8.0.20 🚀 Python-3.10.12 torch-2.0.1+cu118 CPU
YOLOv8n summary (fused): 168 layers, 3151904 parameters, 0 gradients, 8.7 GFLOPs
image 1/1 /content/drive/MyDrive/timepass/27-01-21_13-52-29.png: 384x640 3 chairs, 1 couch, 2 potted plants, 1 tv, 1 book, 2 clocks
Speed: 2.0ms pre-process, 156.9ms inference, 1.8ms postprocess per image at shape (1, 3, 640, 640)
Results saved to runs/detect/predict12
```

```
Image(filename='runs/detect/predict12/27-01-21_13-52-29.png',height=500)
```


```
!yolo task=detect mode=predict model=yolov8n.pt conf=0.25 source='/content/drive/MyDrive/timepass/Road621.jpg' save=true
```

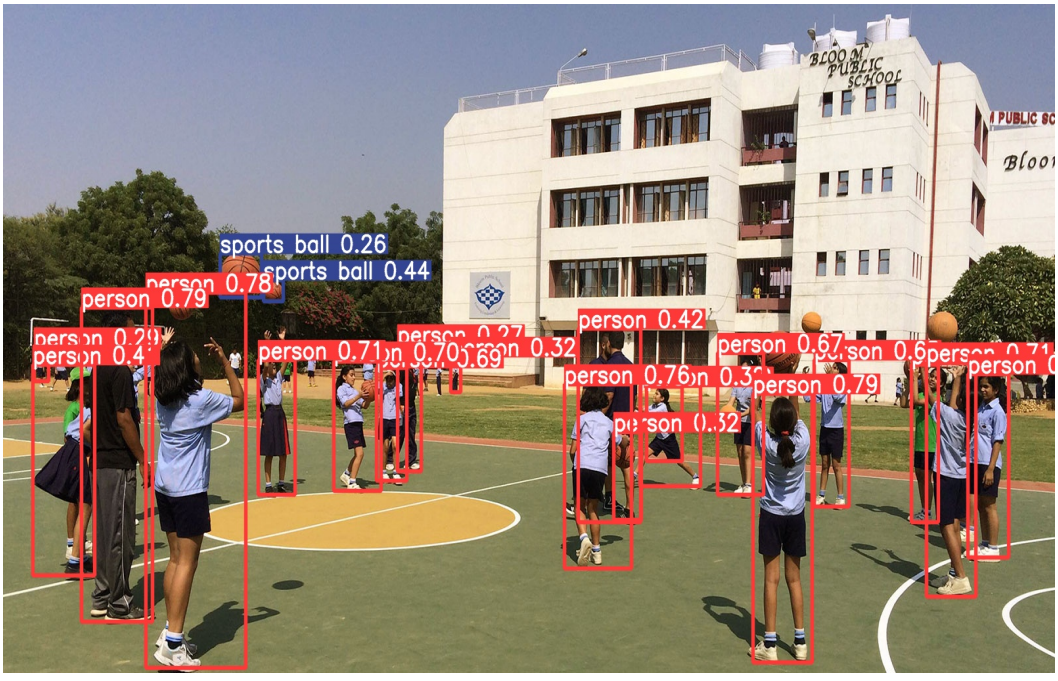
```
2023-09-12 15:58:04.835535: I tensorflow/core/platform/cpu_feature_guard.cc:182] This TensorFlow binary is optimized to use availab
To enable the following instructions: AVX2 FMA, in other operations, rebuild TensorFlow with the appropriate compiler flags.
2023-09-12 15:58:06.325300: W tensorflow/compiler/tf2tensorrt/utils/py_utils.cc:38] TF-TRT Warning: Could not find TensorRT
Ultralytics YOLOv8.0.20 🚀 Python-3.10.12 torch-2.0.1+cu118 CPU
YOLOv8n summary (fused): 168 layers, 3151904 parameters, 0 gradients, 8.7 GFLOPs
image 1/1 /content/drive/MyDrive/timepass/Road621.jpg: 448x640 4 persons, 17 cars, 1 bus, 198.6ms
Speed: 5.7ms pre-process, 198.6ms inference, 2.5ms postprocess per image at shape (1, 3, 640, 640)
Results saved to runs/detect/predict13
```

```
Image(filename='runs/detect/predict13/Road621.jpg',height=500)
```


```
!yolo task=detect mode=predict model=yolov8n.pt conf=0.25 source='/content/drive/MyDrive/timepass/contentpage_124_0_50.jpg' save=true
```

```
2023-09-12 16:01:10.425349: I tensorflow/core/platform/cpu_feature_guard.cc:182] This TensorFlow binary is optimized to use availab
To enable the following instructions: AVX2 FMA, in other operations, rebuild TensorFlow with the appropriate compiler flags.
2023-09-12 16:01:11.588726: W tensorflow/compiler/tf2tensorrt/utils/py_utils.cc:38] TF-TRT Warning: Could not find TensorRT
Ultralytics YOLOv8.0.20 🚀 Python-3.10.12 torch-2.0.1+cu118 CPU
YOLOv8n summary (fused): 168 layers, 3151904 parameters, 0 gradients, 8.7 GFLOPs
image 1/1 /content/drive/MyDrive/timepass/contentpage_124_0_50.jpg: 352x640 20 persons, 2 sports balls, 142.7ms
Speed: 1.9ms pre-process, 142.7ms inference, 1.8ms postprocess per image at shape (1, 3, 640, 640)
Results saved to runs/detect/predict14
```

```
Image(filename='runs/detect/predict14/contentpage_124_0_50.jpg',height=500)
```




```
from IPython.display import display, Javascript, Image
from google.colab.output import eval_js
from google.colab.patches import cv2_imshow
from base64 import b64decode, b64encode
import cv2
import numpy as np
import PIL
import io
import html
import time
import matplotlib.pyplot as plt
%matplotlib inline
```

```
# clone darknet repo
!git clone https://github.com/AlexeyAB/darknet
```

```
Cloning into 'darknet'...
remote: Enumerating objects: 15750, done.
remote: Counting objects: 100% (213/213), done.
remote: Compressing objects: 100% (119/119), done.
remote: Total 15750 (delta 104), reused 162 (delta 92), pack-reused 15537
```

```
Receiving objects: 100% (15750/15750), 14.65 MiB | 18.50 MiB/s, done.
Resolving deltas: 100% (10533/10533), done.
```

```
# change makefile to have GPU, OPENCV and LIBSO enabled
%cd darknet
!sed -i 's/OPENCV=0/OPENCV=1/' Makefile
!sed -i 's/GPU=0/GPU=1/' Makefile
!sed -i 's/CUDNN=0/CUDNN=1/' Makefile
!sed -i 's/CUDNN_HALF=0/CUDNN_HALF=1/' Makefile
!sed -i 's/LIBSO=0/LIBSO=1/' Makefile
```

```
/content/darknet
```

```
!make
```

```
In file included from src/yolo_v2_class.cpp:2:
include/yolo_v2_class.hpp: In member function ‘void track_kalman_t::clear_old_states()’:
include/yolo_v2_class.hpp:879:50: warning: comparison of integer expressions of different signedness: ‘unsigned int’ and ‘int’ [
  879 |                 if ((result_vec_pred[state_id].x > img_size.width) ||
include/yolo_v2_class.hpp:880:50: warning: comparison of integer expressions of different signedness: ‘unsigned int’ and ‘int’ [
  880 |                     (result_vec_pred[state_id].y > img_size.height))
include/yolo_v2_class.hpp: In member function ‘track_kalman_t::tst_t track_kalman_t::get_state_id(bbox_t, std::vector<bool>&)’:
include/yolo_v2_class.hpp:900:30: warning: comparison of integer expressions of different signedness: ‘size_t’ {aka ‘long unsigr
  900 |         for (size_t i = 0; i < max_objects; ++i)
      |                            ~~^~~~~~~~~~~~~~
include/yolo_v2_class.hpp: In member function ‘std::vector<bbox_t> track_kalman_t::predict()’:
include/yolo_v2_class.hpp:990:30: warning: comparison of integer expressions of different signedness: ‘size_t’ {aka ‘long unsigr
  990 |         for (size_t i = 0; i < max_objects; ++i)
      |                            ~~^~~~~~~~~~~~~~
include/yolo_v2_class.hpp: In member function ‘std::vector<bbox_t> track_kalman_t::correct(std::vector<bbox_t>)’:
include/yolo_v2_class.hpp:1025:30: warning: comparison of integer expressions of different signedness: ‘size_t’ {aka ‘long unsig
 1025 |         for (size_t i = 0; i < max_objects; ++i)
      |                            ~~^~~~~~~~~~~~~~
src/yolo_v2_class.cpp: In member function ‘std::vector<bbox_t> Detector::tracking_id(std::vector<bbox_t>, bool, int, int)’:
src/yolo_v2_class.cpp:439:40: warning: comparison of integer expressions of different signedness: ‘std::deque<std::vector<bbox_t
  439 |         if (prev_bbox_vec_deque.size() > frames_story) prev_bbox_vec_deque.pop_back();
      |             ~~~~~~~~~~~~~~~~~~~~~~~~~~~^~~~~~~~~~~~~~
src/yolo_v2_class.cpp:454:34: warning: comparison of integer expressions of different signedness: ‘unsigned int’ and ‘const int’
  454 |                     if (cur_dist < max_dist && (k.track_id == 0 || dist_vec[m] > cur_dist)) {
      |                         ~~~~~~~~~^~~~~~~~~~
src/yolo_v2_class.cpp:478:40: warning: comparison of integer expressions of different signedness: ‘std::deque<std::vector<bbox_t
  478 |         if (prev_bbox_vec_deque.size() > frames_story) prev_bbox_vec_deque.pop_back();
      |             ~~~~~~~~~~~~~~~~~~~~~~~~~~~^~~~~~~~~~~~~~
g++ -std=c++11 -std=c++11 -Iinclude/ -I3rdparty/stb/include -DOPENCV `pkg-config --cflags opencv4 2> /dev/null || pkg-config --c
In file included from src/yolo_console_dll.cpp:23:
include/yolo_v2_class.hpp: In member function ‘void track_kalman_t::clear_old_states()’:
include/yolo_v2_class.hpp:879:50: warning: comparison of integer expressions of different signedness: ‘unsigned int’ and ‘int’ [
  879 |                 if ((result_vec_pred[state_id].x > img_size.width) ||
include/yolo_v2_class.hpp:880:50: warning: comparison of integer expressions of different signedness: ‘unsigned int’ and ‘int’ [
  880 |                     (result_vec_pred[state_id].y > img_size.height))
include/yolo_v2_class.hpp: In member function ‘track_kalman_t::tst_t track_kalman_t::get_state_id(bbox_t, std::vector<bool>&)’:
include/yolo_v2_class.hpp:900:30: warning: comparison of integer expressions of different signedness: ‘size_t’ {aka ‘long unsigr
  900 |         for (size_t i = 0; i < max_objects; ++i)
      |                            ~~^~~~~~~~~~~~~~
include/yolo_v2_class.hpp: In member function ‘std::vector<bbox_t> track_kalman_t::predict()’:
include/yolo_v2_class.hpp:990:30: warning: comparison of integer expressions of different signedness: ‘size_t’ {aka ‘long unsigr
  990 |         for (size_t i = 0; i < max_objects; ++i)
      |                            ~~^~~~~~~~~~~~~~
include/yolo_v2_class.hpp: In member function ‘std::vector<bbox_t> track_kalman_t::correct(std::vector<bbox_t>)’:
include/yolo_v2_class.hpp:1025:30: warning: comparison of integer expressions of different signedness: ‘size_t’ {aka ‘long unsig
 1025 |         for (size_t i = 0; i < max_objects; ++i)
      |                            ~~^~~~~~~~~~~~~~
src/yolo_console_dll.cpp: In function ‘void draw_boxes(cv::Mat, std::vector<bbox_t>, std::vector<std::__cxx11::basic_string<char
src/yolo_console_dll.cpp:192:46: warning: comparison of integer expressions of different signedness: ‘const int’ and ‘unsigned i
  192 |             int max_width = (text_size.width > i.w + 2) ? text_size.width : (i.w + 2);
      |                              ~~~~~~~~~~~~~~~~~^~~~~~~~
src/yolo_console_dll.cpp:201:62: warning: comparison of integer expressions of different signedness: ‘const int’ and ‘unsigned i
  201 |                 int const max_width_3d = (text_size_3d.width > i.w + 2) ? text_size_3d.width : (i.w + 2);
      |                                          ~~~~~~~~~~~~~~~~~~~^~~~~~~~~
src/yolo_console_dll.cpp:183:15: warning: unused variable ‘colors’ [-Wunused-variable]
  183 |     int const colors[6][3] = { { 1,0,1 },{ 0,0,1 },{ 0,1,1 },{ 0,1,0 },{ 1,1,0 },{ 1,0,0 } };
      |               ^~~~~~
```

```
# get bthe scaled yolov4 weights file that is pre-trained to detect 80 classes (objects) from shared google drive
!wget --load-cookies /tmp/cookies.txt "https://docs.google.com/uc?export=download&confirm=$(wget --quiet --save-cookies /tmp/cookies.txt
```

```
--2023-09-12 16:05:47--  https://docs.google.com/uc?export=download&confirm=t&id=1V3vsIaxAlGWvK4Aar9bAiK5U0QFttKwq
Resolving docs.google.com (docs.google.com)... 108.177.127.102, 108.177.127.139, 108.177.127.113, ...
Connecting to docs.google.com (docs.google.com)|108.177.127.102|:443... connected.
HTTP request sent, awaiting response... 303 See Other
Location: https://doc-14-84-docs.googleusercontent.com/docs/securesc/ha0ro937gcuc7l7deffksulhg5h7mbp1/f42v1imi6k9spfbbpharsjglavfnr
Warning: wildcards not supported in HTTP.
--2023-09-12 16:05:47--  https://doc-14-84-docs.googleusercontent.com/docs/securesc/ha0ro937gcuc7l7deffksulhg5h7mbp1/f42v1imi6k9spf
Resolving doc-14-84-docs.googleusercontent.com (doc-14-84-docs.googleusercontent.com)... 142.251.31.132, 2a00:1450:4013:c1a::84
Connecting to doc-14-84-docs.googleusercontent.com (doc-14-84-docs.googleusercontent.com)|142.251.31.132|:443... connected.
HTTP request sent, awaiting response... 200 OK
```

```
Length: 211944840 (202M) [application/octet-stream]
Saving to: ‘yolov4-csp.weights’

yolov4-csp.weights  100%[===================>] 202.13M  52.3MB/s    in 3.9s

2023-09-12 16:05:52 (52.3 MB/s) - ‘yolov4-csp.weights’ saved [211944840/211944840]
```

```
# run test on person.jpg image that comes with repository
image = cv2.imread("images1.jpeg")
detections, width_ratio, height_ratio = darknet_helper(image, width, height)

for label, confidence, bbox in detections:
  left, top, right, bottom = bbox2points(bbox)
  left, top, right, bottom = int(left * width_ratio), int(top * height_ratio), int(right * width_ratio), int(bottom * height_ratio)
  cv2.rectangle(image, (left, top), (right, bottom), class_colors[label], 2)
  cv2.putText(image, "{} [{:.2f}]".format(label, float(confidence)),
                    (left, top - 5), cv2.FONT_HERSHEY_SIMPLEX, 0.5,
                    class_colors[label], 2)
cv2_imshow(image)
```

```
---------------------------------------------------------------------------
AttributeError                            Traceback (most recent call last)
<ipython-input-76-bc6c5c7e2ed4> in <cell line: 12>()
     10                     (left, top - 5), cv2.FONT_HERSHEY_SIMPLEX, 0.5,
     11                     class_colors[label], 2)
---> 12 cv2_imshow(image)

/usr/local/lib/python3.10/dist-packages/google/colab/patches/__init__.py in cv2_imshow(a)
     16       (N, M, 4) is an NxM BGRA color image.
     17   """
---> 18   a = a.clip(0, 255).astype('uint8')
     19   # cv2 stores colors as BGR; convert to RGB
     20   if a.ndim == 3:

AttributeError: 'NoneType' object has no attribute 'clip'
```

SEARCH STACK OVERFLOW

```
import cv2

def darknet_helper(image, width, height):

    pass

width = 640
height = 480

# Load the image
image = cv2.imread("/content/drive/MyDrive/timepass/9991.jpg")

# Call the darknet_helper function
detections, width_ratio, height_ratio = darknet_helper(image, width, height)

for label, confidence, bbox in detections:
  left, top, right, bottom = bbox2points(bbox)
  left, top, right, bottom = int(left * width_ratio), int(top * height_ratio), int(right * width_ratio), int(bottom * height_ratio)
  cv2.rectangle(image, (left, top), (right, bottom), class_colors[label], 2)
  cv2.putText(image, "{} [{:.2f}]".format(label, float(confidence)),
                    (left, top - 5), cv2.FONT_HERSHEY_SIMPLEX, 0.5,
                    class_colors[label], 2)
cv2_imshow(image)
```

```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
<ipython-input-68-e231dd514ec1> in <cell line: 14>()
     12
     13 # Call the darknet_helper function
---> 14 detections, width_ratio, height_ratio = darknet_helper(image, width, height)
     15
     16 for label, confidence, bbox in detections:

TypeError: cannot unpack non-iterable NoneType object
```

SEARCH STACK OVERFLOW

```
# function to convert the JavaScript object into an OpenCV image
def js_to_image(js_reply):
  """
  Params:
```

```
        js_reply: JavaScript object containing image from webcam
  Returns:
        img: OpenCV BGR image
  """
  # decode base64 image
  image_bytes = b64decode(js_reply.split(',')[1])
  # convert bytes to numpy array
  jpg_as_np = np.frombuffer(image_bytes, dtype=np.uint8)
  # decode numpy array into OpenCV BGR image
  img = cv2.imdecode(jpg_as_np, flags=1)

  return img

# function to convert OpenCV Rectangle bounding box image into base64 byte string to be overlayed on video stream
def bbox_to_bytes(bbox_array):
  """
  Params:
        bbox_array: Numpy array (pixels) containing rectangle to overlay on video stream.
  Returns:
      bytes: Base64 image byte string
  """
  # convert array into PIL image
  bbox_PIL = PIL.Image.fromarray(bbox_array, 'RGBA')
  iobuf = io.BytesIO()
  # format bbox into png for return
  bbox_PIL.save(iobuf, format='png')
  # format return string
  bbox_bytes = '{}'.format((str(b64encode(iobuf.getvalue()), 'utf-8')))

  return bbox_bytes
```

```
# JavaScript to properly create our live video stream using our webcam as input
def video_stream():
  js = Javascript('''
    var video;
    var div = null;
    var stream;
    var captureCanvas;
    var imgElement;
    var labelElement;

    var pendingResolve = null;
    var shutdown = false;

    function removeDom() {
       stream.getVideoTracks()[0].stop();
       video.remove();
       div.remove();
       video = null;
       div = null;
       stream = null;
       imgElement = null;
       captureCanvas = null;
       labelElement = null;
    }

    function onAnimationFrame() {
      if (!shutdown) {
        window.requestAnimationFrame(onAnimationFrame);
      }
      if (pendingResolve) {
        var result = "";
        if (!shutdown) {
          captureCanvas.getContext('2d').drawImage(video, 0, 0, 640, 480);
          result = captureCanvas.toDataURL('image/jpeg', 0.8)
        }
        var lp = pendingResolve;
        pendingResolve = null;
        lp(result);
      }
    }

    async function createDom() {
      if (div !== null) {
        return stream;
      }

      div = document.createElement('div');
      div.style.border = '2px solid black';
      div.style.padding = '3px';
      div.style.width = '100%';
```

```
    div.style.maxWidth = '600px';
    document.body.appendChild(div);

    const modelOut = document.createElement('div');
    modelOut.innerHTML = "<span>Status:</span>";
    labelElement = document.createElement('span');
    labelElement.innerText = 'No data';
    labelElement.style.fontWeight = 'bold';
    modelOut.appendChild(labelElement);
    div.appendChild(modelOut);

    video = document.createElement('video');
    video.style.display = 'block';
    video.width = div.clientWidth - 6;
    video.setAttribute('playsinline', '');
    video.onclick = () => { shutdown = true; };
    stream = await navigator.mediaDevices.getUserMedia(
        {video: { facingMode: "environment"}});
    div.appendChild(video);

    imgElement = document.createElement('img');
    imgElement.style.position = 'absolute';
    imgElement.style.zIndex = 1;
    imgElement.onclick = () => { shutdown = true; };
    div.appendChild(imgElement);

    const instruction = document.createElement('div');
    instruction.innerHTML =
        '<span style="color: red; font-weight: bold;">' +
        'When finished, click here or on the video to stop this demo</span>';
    div.appendChild(instruction);
    instruction.onclick = () => { shutdown = true; };

    video.srcObject = stream;
    await video.play();

    captureCanvas = document.createElement('canvas');
    captureCanvas.width = 640; //video.videoWidth;
    captureCanvas.height = 480; //video.videoHeight;
    window.requestAnimationFrame(onAnimationFrame);

    return stream;
  }
  async function stream_frame(label, imgData) {
    if (shutdown) {
      removeDom();
      shutdown = false;
      return '';
    }

    var preCreate = Date.now();
    stream = await createDom();

    var preShow = Date.now();
    if (label != "") {
      labelElement.innerHTML = label;
    }

    if (imgData != "") {
      var videoRect = video.getClientRects()[0];
      imgElement.style.top = videoRect.top + "px";
      imgElement.style.left = videoRect.left + "px";
      imgElement.style.width = videoRect.width + "px";
      imgElement.style.height = videoRect.height + "px";
      imgElement.src = imgData;
    }

    var preCapture = Date.now();
    var result = await new Promise(function(resolve, reject) {
      pendingResolve = resolve;
    });
    shutdown = false;

    return {'create': preShow - preCreate,
            'show': preCapture - preShow,
            'capture': Date.now() - preCapture,
            'img': result};
  }
  ''')

display(js)
```

```
def video_frame(label, bbox):
  data = eval_js('stream_frame("{}", "{}")'.format(label, bbox))
  return data
```

```
# start streaming video from webcam
video_stream()
# label for video
label_html = 'Capturing...'
# initialze bounding box to empty
bbox = ''
count = 0
while True:
    js_reply = video_frame(label_html, bbox)
    if not js_reply:
        break

    # convert JS response to OpenCV Image
    frame = js_to_image(js_reply["img"])

    # create transparent overlay for bounding box
    bbox_array = np.zeros([480,640,4], dtype=np.uint8)

    # call our darknet helper on video frame
    detections, width_ratio, height_ratio = darknet_helper(frame, width, height)

    # loop through detections and draw them on transparent overlay image
    for label, confidence, bbox in detections:
      left, top, right, bottom = bbox2points(bbox)
      left, top, right, bottom = int(left * width_ratio), int(top * height_ratio), int(right * width_ratio), int(bottom * height_ratio)
      bbox_array = cv2.rectangle(bbox_array, (left, top), (right, bottom), class_colors[label], 2)
      bbox_array = cv2.putText(bbox_array, "{} [{:.2f}]".format(label, float(confidence)),
                       (left, top - 5), cv2.FONT_HERSHEY_SIMPLEX, 0.5,
                       class_colors[label], 2)

    bbox_array[:,:,3] = (bbox_array.max(axis = 2) > 0 ).astype(int) * 255
    # convert overlay of bbox into bytes
    bbox_bytes = bbox_to_bytes(bbox_array)
    # update bbox so next frame gets new overlay
    bbox = bbox_bytes
```

0s completed at 9:48 PM