```
Name: Borris A. Esplanada
Section: CPE 019 - CPE32S1
Instructor: Engr. Roman Richard
```

```
S!nvidia-smi
```

```
Mon Jul  8 05:48:26 2024
+---------------------------------------------------------------------------------------+
| NVIDIA-SMI 535.104.05             Driver Version: 535.104.05   CUDA Version: 12.2     |
|-----------------------------------------+----------------------+----------------------+
| GPU  Name                 Persistence-M | Bus-Id        Disp.A | Volatile Uncorr. ECC |
| Fan  Temp   Perf          Pwr:Usage/Cap |         Memory-Usage | GPU-Util  Compute M. |
|                                         |                      |               MIG M. |
|=========================================+======================+======================|
|   0  Tesla T4                       Off | 00000000:00:04.0 Off |                    0 |
| N/A   46C    P8              10W /  70W |      0MiB / 15360MiB |      0%      Default |
|                                         |                      |                  N/A |
+-----------------------------------------+----------------------+----------------------+

+---------------------------------------------------------------------------------------+
| Processes:                                                                            |
|  GPU   GI   CI        PID   Type   Process name                            GPU Memory |
|        ID   ID                                                             Usage      |
|=======================================================================================|
|  No running processes found                                                           |
+---------------------------------------------------------------------------------------+
```

```
import os
HOME = os.getcwd()
print(HOME)
```

```
/content
```

Download video

```
!pip install -q gdown
%cd {HOME}
!gdown '1ODtJQAjiTHDaXyuO-CacaKmvMnZ6WJi2'
```

```
/content
Downloading...
From (original): https://drive.google.com/uc?id=1ODtJQAjiTHDaXyuO-CacaKmvMnZ6WJi2
From (redirected): https://drive.google.com/uc?id=1ODtJQAjiTHDaXyuO-CacaKmvMnZ6WJi2&confirm=t&uuid=53f1f71d-e95f-4c19-a0b5-dabf406e2a2b
To: /content/highway.mp4
100% 219M/219M [00:02<00:00, 97.3MB/s]
```

```
SOURCE_VIDEO_PATH = f"{HOME}/highway.mp4"
```

Installing YOLOv8

```
!pip install ultralytics

from IPython import display
display.clear_output()

import ultralytics
ultralytics.checks()
```

```
Ultralytics YOLOv8.2.50 🚀 Python-3.10.12 torch-2.3.0+cu121 CUDA:0 (Tesla T4, 15102MiB)
Setup complete ✅ (2 CPUs, 12.7 GB RAM, 30.4/78.2 GB disk)
```

Install Roboflow Supervision

```
!pip install supervision

from IPython import display
display.clear_output()

import supervision as sv
print("supervision.__version__:", sv.__version__)
```

```
supervision.__version__: 0.21.0
```

Load pre-trained YOLOv8 model

```
MODEL = "yolov8x.pt"
```

```
from ultralytics import YOLO

model = YOLO(MODEL)
model.fuse()
```

```
Downloading https://github.com/ultralytics/assets/releases/download/v8.2.0/yolov8x.pt to 'yolov8x.pt'...
100%|██████████| 131M/131M [00:00<00:00, 252MB/s]
YOLOv8x summary (fused): 268 layers, 68200608 parameters, 0 gradients, 257.8 GFLOPs
```

Predict and annotate single frame

```
# dict maping class_id to class_name
CLASS_NAMES_DICT = model.model.names

# class_ids of interest - person
selected_classes = [0]
```

```
import supervision as sv
import numpy as np
```

```
# create frame generator
generator = sv.get_video_frames_generator(SOURCE_VIDEO_PATH)
# create instance of BoxAnnotator
box_annotator = sv.BoxAnnotator(thickness=2, text_thickness=1, text_scale=0.8)
# acquire first video frame
iterator = iter(generator)
frame = next(iterator)
# model prediction on single frame and conversion to supervision Detections
results = model(frame, verbose=False)[0]

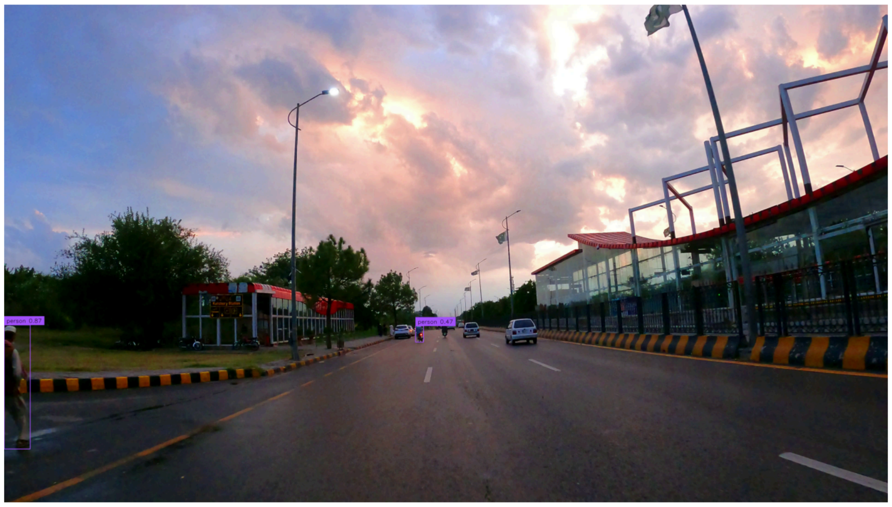
# convert to Detections
detections = sv.Detections.from_ultralytics(results)
# only consider class id from selected_classes define above
detections = detections[np.isin(detections.class_id, selected_classes)]

# format custom labels
labels = [
    f"{CLASS_NAMES_DICT[class_id]} {confidence:0.2f}"
    for confidence, class_id in zip(detections.confidence, detections.class_id)
]

# annotate and display frame
anotated_frame=box_annotator.annotate(scene=frame, detections=detections, labels=labels)

%matplotlib inline
sv.plot_image(anotated_frame, (16,16))
```

```
SupervisionWarnings: annotate is deprecated: `BoxAnnotator` is deprecated and will be re
```



Predict and annotate whole video

```
# settings
LINE_START = sv.Point(50, 1500)
LINE_END = sv.Point(3840-50, 1500)

TARGET_VIDEO_PATH = f"{HOME}/Highway-People-Counting-Results.mp4"
```

```
sv.VideoInfo.from_video_path(SOURCE_VIDEO_PATH)
```

```
VideoInfo(width=3840, height=2160, fps=25, total_frames=289)
```

```
# create BYTETracker instance
byte_tracker = sv.ByteTrack(track_thresh=0.25, track_buffer=30, match_thresh=0.8, frame_rate=30)

# create VideoInfo instance
video_info = sv.VideoInfo.from_video_path(SOURCE_VIDEO_PATH)

# create frame generator
generator = sv.get_video_frames_generator(SOURCE_VIDEO_PATH)

# create LineZone instance, it is previously called LineCounter class
line_zone = sv.LineZone(start=LINE_START, end=LINE_END)

# create instance of BoxAnnotator
box_annotator = sv.BoxAnnotator(thickness=2, text_thickness=1, text_scale=0.8)

# create instance of TraceAnnotator
trace_annotator = sv.TraceAnnotator(thickness=0, trace_length=100)

# create LineZoneAnnotator instance, it is previously called LineCounterAnnotator class
line_zone_annotator = sv.LineZoneAnnotator(thickness=4, text_thickness=4, text_scale=2)

# define call back function to be used in video processing
def callback(frame: np.ndarray, index:int) -> np.ndarray:
    # model prediction on single frame and conversion to supervision Detections
    results = model(frame, verbose=False)[0]
    detections = sv.Detections.from_ultralytics(results)
    # only consider class id from selected_classes define above
    detections = detections[np.isin(detections.class_id, selected_classes)]
    # tracking detections
    detections = byte_tracker.update_with_detections(detections)
    labels = [
        f"#{tracker_id} {model.model.names[class_id]} {confidence:0.2f}"
        for confidence, class_id, tracker_id
        in zip(detections.confidence, detections.class_id, detections.tracker_id)
    ]
    annotated_frame = trace_annotator.annotate(
        scene=frame.copy(),
        detections=detections
    )
    annotated_frame=box_annotator.annotate(
        scene=annotated_frame,
        detections=detections,
        labels=labels)

    # update line counter
    line_zone.trigger(detections)
    #line annotated result
    return  line_zone_annotator.annotate(annotated_frame, line_counter=line_zone)

# process the whole video
sv.process_video(
    source_path = SOURCE_VIDEO_PATH,
    target_path = TARGET_VIDEO_PATH,
    callback=callback
)
```

```
SupervisionWarnings: `track_buffer` in `ByteTrack.__init__` is deprecated and will be remove in `supervision-0.23.0`. Use 'lost_track_
SupervisionWarnings: `track_thresh` in `ByteTrack.__init__` is deprecated and will be remove in `supervision-0.23.0`. Use 'track_activ
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