```
31.03.2024, 00:12
                                                                     Untitled2.ipynb - Colaboratory
    !pip install supervision==0.19.0
         Requirement already satisfied: supervision==0.19.0 in /usr/local/lib/python3.10/dist-packages (0.19.0)
         Requirement already satisfied: defusedxml<0.8.0,>=0.7.1 in /usr/local/lib/python3.10/dist-packages (from supervision==0.19.0) (0.7.
         Requirement already satisfied: matplotlib>=3.6.0 in /usr/local/lib/python3.10/dist-packages (from supervision==0.19.0) (3.7.1)
         Requirement already satisfied: numpy>=1.21.2 in /usr/local/lib/python3.10/dist-packages (from supervision==0.19.0) (1.25.2)
         Requirement already satisfied: opencv-python-headless>=4.5.5.64 in /usr/local/lib/python3.10/dist-packages (from supervision==0.19.
         Requirement already satisfied: pillow>=9.4 in /usr/local/lib/python3.10/dist-packages (from supervision==0.19.0) (9.4.0)
         Requirement already satisfied: pyyaml>=5.3 in /usr/local/lib/python3.10/dist-packages (from supervision==0.19.0) (6.0.1)
         Requirement already satisfied: scipy<2.0.0,>=1.10.0 in /usr/local/lib/python3.10/dist-packages (from supervision==0.19.0) (1.11.4)
         Requirement already satisfied: contourpy>=1.0.1 in /usr/local/lib/python3.10/dist-packages (from matplotlib>=3.6.0->supervision==0.
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    !pip install ultralytics
         Requirement already satisfied: ultralytics in /usr/local/lib/python3.10/dist-packages (8.1.37)
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         Requirement already satisfied: pandas>=1.1.4 in /usr/local/lib/python3.10/dist-packages (from ultralytics) (1.5.3)
         Requirement already satisfied: seaborn>=0.11.0 in /usr/local/lib/python3.10/dist-packages (from ultralytics) (0.13.1)
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         Requirement already satisfied: pytz>=2020.1 in /usr/local/lib/python3.10/dist-packages (from pandas>=1.1.4->ultralytics) (2023.4)
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         Requirement already satisfied: MarkupSafe>=2.0 in /usr/local/lib/python3.10/dist-packages (from jinja2->torch>=1.8.0->ultralytics)
         Requirement already satisfied: mpmath>=0.19 in /usr/local/lib/python3.10/dist-packages (from sympy->torch>=1.8.0->ultralytics) (1.3
         4
```

```
import supervision as sv
import cv2
import numpy as np
import torch
from ultralytics import YOLO
model = YOLO('yolov8s.pt')
```

```
if torch.cuda.is_available:
   device = 'cuda'
elif torch.backends.mps.is available:
    device = 'mps'
   device = 'cpu'
model.to(device)
                   (act): SiLU(inplace=True)
                 (1): Conv(
                   (conv): Conv2d(64, 64, kernel\_size=(3, 3), stride=(1, 1), padding=(1, 1), bias=False)
                   (bn): BatchNorm2d(64, eps=0.001, momentum=0.03, affine=True, track running stats=True)
                   (act): SiLU(inplace=True)
                 (2): Conv2d(64, 64, kernel_size=(1, 1), stride=(1, 1))
             (cv3): ModuleList(
               (0): Sequential(
                 (0): Conv(
                   (conv): Conv2d(128, 128, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1), bias=False)
                   (bn): BatchNorm2d(128, eps=0.001, momentum=0.03, affine=True, track_running_stats=True)
                   (act): SiLU(inplace=True)
                 (1): Conv(
                   (conv): Conv2d(128, 128, kernel\_size=(3, 3), stride=(1, 1), padding=(1, 1), bias=False)
                   (bn): BatchNorm2d(128, eps=0.001, momentum=0.03, affine=True, track_running_stats=True)
                   (act): SiLU(inplace=True)
                 (2): Conv2d(128, 80, kernel_size=(1, 1), stride=(1, 1))
               (1): Sequential(
                 (0): Conv(
                   (conv): Conv2d(256, 128, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1), bias=False)
                   (bn): BatchNorm2d(128, eps=0.001, momentum=0.03, affine=True, track_running_stats=True)
                   (act): SiLU(inplace=True)
                 (1): Conv(
                   (conv): Conv2d(128, 128, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1), bias=False)
                   (bn): BatchNorm2d(128, eps=0.001, momentum=0.03, affine=True, track_running_stats=True)
                   (act): SiLU(inplace=True)
                 (2): Conv2d(128, 80, kernel_size=(1, 1), stride=(1, 1))
               (2): Sequential(
                 (0): Conv(
                   (conv): Conv2d(512, 128, kernel_size=(3, 3), stride=(1, 1), padding=(1, 1), bias=False)
                   (bn): BatchNorm2d(128, eps=0.001, momentum=0.03, affine=True, track_running_stats=True)
                   (act): SiLU(inplace=True)
                 (1): Conv(
                   (conv): Conv2d(128, 128, kernel\_size=(3, 3), stride=(1, 1), padding=(1, 1), bias=False)
                   (bn): BatchNorm2d(128, eps=0.001, momentum=0.03, affine=True, track_running_stats=True)
                   (act): SiLU(inplace=True)
                 (2): Conv2d(128, 80, kernel_size=(1, 1), stride=(1, 1))
               )
               (conv): Conv2d(16, 1, kernel_size=(1, 1), stride=(1, 1), bias=False)
      )
from google.colab import drive
drive.mount('/content/drive/')
```

Drive already mounted at /content/drive/; to attempt to forcibly remount, call drive.mount("/content/drive/", force_remount=True).

```
# 1 способ подсчета времени (смотрим разницу в прохождении одного отрезка соседними людьми и умножаем на кол-во людей в очереди)
video_info = sv.VideoInfo.from_video_path('/content/drive/MyDrive/data_sir/video/file7.mp4') # Сириус ближе к кассе
byte track = sv.ByteTrack(frame rate=video info.fps)
frames_generator = sv.get_video_frames_generator('/content/drive/MyDrive/data_sir/video/file7.mp4')
time = 0
polygon_entry = np.array([
[495, 315],[639, 403],[755, 319],[555, 215],[495, 311]
1)
polygon_queue = np.array([
[8, 83],[8, 251],[192, 203],[808, 571],[1016, 567],[1028, 295],[244, 87],[100, 127],[101, 63],[7, 83]
])
polygon_table = np.array([
[39, 209],[55, 253],[175, 229],[159, 169],[51, 181],[35, 205]
polygon_check = np.array([
[206, 106],[218, 198],[182, 206],[170, 114],[206, 106]
box_annotator = sv.BoxAnnotator(thickness=1, text_thickness=1, text_scale=0.5)
zone_entry = sv.PolygonZone(polygon=polygon_entry, frame_resolution_wh=video_info.resolution_wh)
zone_queue = sv.PolygonZone(polygon=polygon_queue, frame_resolution_wh=video_info.resolution_wh)
zone_table = sv.PolygonZone(polygon=polygon_table, frame_resolution_wh=video_info.resolution_wh)
zone_check = sv.PolygonZone(polygon=polygon_check, frame_resolution_wh=video_info.resolution_wh)
zone_annotator_queue = sv.PolygonZoneAnnotator(zone=zone_queue, color=sv.Color.white(), thickness=3, text_thickness=3, text_scale=2)
zone_annotator_table = sv.PolygonZoneAnnotator(zone=zone_table, color=sv.Color.white(), thickness=3, text_thickness=3, text_scale=2)
zone_annotator_check = sv.PolygonZoneAnnotator(zone=zone_check, color=sv.Color.white(), thickness=3, text_thickness=3, text_scale=2)
entry_ids = []
last_entry_time = 0
times = []
with sv.VideoSink(target_path='/content/drive/MyDrive/data_sir/video/method_Ilya_two.mp4', video_info=video_info) as sink:
  for frame in frames_generator:
      time += 1/10
     results = model(frame, imgsz=1280)[0]
      detections = sv.Detections.from_ultralytics(results)
     detections = detections[detections.class_id==0]
     detections = byte_track.update_with_detections(detections=detections)
      zone_entry.trigger(detections=detections)
     {\tt CONST = 7 if (zone\_check.trigger(detections=detections)==True).sum() > 0 else 0}
      count = (zone_queue.trigger(detections=detections)==True).sum() - (zone_table.trigger(detections=detections)==True).sum() + CONST
     detections = detections[zone_entry.trigger(detections=detections)==True]
      print(detections.tracker_id)
      for id in detections.tracker_id:
          if id not in entry_ids:
              if len(entry_ids) == 0:
                  last entry time = time
                  times.append((time - last_entry_time) * count)
                  last_entry_time = time
                  entry ids.append(id)
              else:
                  print(f'people: {count}, id: {id}, time: {time}, last time: {last_entry_time}')
                  times.append((time - last_entry_time) * count)
                  last_entry_time = time
                  entry_ids.append(id)
      box_annotator = sv.BoxAnnotator(thickness=1, text_thickness=1, text_scale=0.5)
     labels = [
          f'#{tracker_id}'
          for tracker id
          in detections.tracker_id]
      frame = box_annotator.annotate(scene=frame, detections=detections, labels=labels)
      frame = zone\_annotator\_check.annotate(zone\_annotator\_queue.annotate(zone\_annotator\_table.annotate(scene=frame)))
      sink.write_frame(frame=frame)
print(f'average time for waiting: {sum(times)/len(times)}s')
```

Текст заголовка по умолчанию

```
# @title Текст заголовка по умолчанию
# 2 way of calculating waitiing time
# do everything the same except for other polygons
video_info = sv.VideoInfo.from_video_path('/content/drive/MyDrive/data_sir/video/Itog.mp4')
byte_track = sv.ByteTrack(frame_rate=video_info.fps)
frames_generator = sv.get_video_frames_generator('/content/drive/MyDrive/data_sir/video/Itog.mp4')
time = 0
polygon_left = np.array([
[11, 583],[19, 699],[171, 703],[159, 575],[15, 579]
1)
polygon_right = np.array([
[964, 541],[1068, 489],[972, 393],[1068, 345],[1152, 405],[1132, 705],[980, 709],[964, 537]
1)
box_annotator = sv.BoxAnnotator(thickness=1, text_thickness=1, text_scale=0.5)
zone_left = sv.PolygonZone(polygon=polygon_left, frame_resolution_wh=video_info.resolution_wh)
zone_right = sv.PolygonZone(polygon=polygon_right, frame_resolution_wh=video_info.resolution_wh)
zone_annotator_left = sv.PolygonZoneAnnotator(zone=zone_left, color=sv.Color.white(), thickness=3, text_thickness=3, text_scale=2)
zone_annotator_right = sv.PolygonZoneAnnotator(zone=zone_right, color=sv.Color.white(), thickness=3, text_thickness=3, text_scale=2)
# here we initialize twice more arrays (as we want to see the number of people enetring and exiting the queue)
entry ids = []
exit_ids = []
entry_times = []
exit_times = []
with sv.VideoSink(target_path='queues_results_two.mp4', video_info=video_info) as sink:
  for frame in frames_generator:
      time += 1/video info.fps
     results = model(frame, imgsz=1280)[0]
     detections = sv.Detections.from_ultralytics(results)
     detections = detections[detections.class_id==0]
     zone left.trigger(detections=detections)
      zone_right.trigger(detections=detections)
     detections = byte_track.update_with_detections(detections=detections)
      for id in detections.tracker_id[zone_left.trigger(detections=detections)==True]:
          if id not in exit_ids:
              exit_times.append(time)
             exit ids.append(id)
      for id in detections.tracker_id[zone_right.trigger(detections=detections)==True]:
          if id not in entry_ids:
             entry_times.append(time)
              entry_ids.append(id)
      if len(exit times) >= 3:
          waiting_time = int(np.mean(np.asarray(exit_times[-3:]) - np.asarray(entry_times[len(exit_times)-3:len(exit_times)])))
          print(f'waiting time is {waiting_time}s')
      box_annotator = sv.BoxAnnotator(thickness=1, text_thickness=1, text_scale=0.5)
      labels_left = [
         f'#{tracker id}'
          for tracker_id
          in detections.tracker_id[zone_left.trigger(detections=detections)==True]]
      labels right = [
          f'#{tracker_id}'
          for tracker id
          in detections.tracker_id[zone_right.trigger(detections=detections)==True]]
      frame = box_annotator.annotate(scene=frame, detections=detections[zone_left.trigger(detections=detections)==True], labels=labels_
      frame = box_annotator.annotate(scene=frame, detections=detections[zone_right.trigger(detections=detections)==True], labels=labels
      frame = zone_annotator_left.annotate(zone_annotator_right.annotate(scene=frame))
      sink.write_frame(frame=frame)
```

```
Speed: 5.6ms preprocess, 24.1ms inference, 2.0ms postprocess per image at shape (1, 3, 736, 1280)
     waiting time is 86s
     0: 736x1280 31 persons, 1 bottle, 1 bowl, 12 chairs, 2 dining tables, 24.4ms
     Speed: 4.3ms preprocess, 24.4ms inference, 5.1ms postprocess per image at shape (1, 3, 736, 1280)
     SupervisionWarnings: BoxAnnotator is deprecated: `BoxAnnotator` is deprecated and will be removed in `supervision-0.22.0`. Use SupervisionWarnings: BoxAnnotator is deprecated: `BoxAnnotator` is deprecated and will be removed in `supervision-0.22.0`. Use
     SupervisionWarnings: BoxAnnotator is deprecated: `BoxAnnotator` is deprecated and will be removed in `supervision-0.22.0`. Use
     0: 736x1280 29 persons, 1 bottle, 1 bowl, 12 chairs, 2 dining tables, 25.0ms
     Speed: 4.2ms preprocess, 25.0ms inference, 4.1ms postprocess per image at shape (1, 3, 736, 1280)
     waiting time is 86s
     0: 736x1280 24 persons, 1 bench, 1 handbag, 1 bottle, 1 bowl, 13 chairs, 2 dining tables, 24.9ms
     Speed: 4.3ms preprocess, 24.9ms inference, 2.2ms postprocess per image at shape (1, 3, 736, 1280)
     waiting time is 86s
     0: 736x1280 26 persons, 1 bench, 1 bottle, 1 bowl, 13 chairs, 3 dining tables, 24.8ms
     Speed: 4.2ms preprocess, 24.8ms inference, 3.2ms postprocess per image at shape (1, 3, 736, 1280)
     waiting time is 86s
     SupervisionWarnings: BoxAnnotator is deprecated: `BoxAnnotator` is deprecated and will be removed in `supervision-0.22.0`. Use SupervisionWarnings: BoxAnnotator is deprecated: `BoxAnnotator` is deprecated and will be removed in `supervision-0.22.0`. Use SupervisionWarnings: BoxAnnotator is deprecated: `BoxAnnotator` is deprecated and will be removed in `supervision-0.22.0`. Use
     0: 736x1280 26 persons, 1 bench, 1 bottle, 1 bowl, 10 chairs, 2 dining tables, 25.5ms
     Speed: 3.7ms preprocess, 25.5ms inference, 4.5ms postprocess per image at shape (1, 3, 736, 1280)
     waiting time is 86s
     0: 736x1280 26 persons, 1 bench, 1 bottle, 1 bowl, 11 chairs, 2 dining tables, 24.8ms
     Speed: 3.9ms preprocess, 24.8ms inference, 1.7ms postprocess per image at shape (1, 3, 736, 1280)
     waiting time is 86s
     0: 736x1280 28 persons, 1 bench, 1 bottle, 1 bowl, 13 chairs, 2 dining tables, 24.7ms
     Speed: 3.3ms preprocess, 24.7ms inference, 1.7ms postprocess per image at shape (1, 3, 736, 1280)
     waiting time is 86s
     SupervisionWarnings: BoxAnnotator is deprecated: `BoxAnnotator` is deprecated and will be removed in `supervision-0.22.0`. Use
     SupervisionWarnings: BoxAnnotator is deprecated: `BoxAnnotator` is deprecated and will be removed in `supervision-0.22.0`. Use
     SupervisionWarnings: BoxAnnotator is deprecated: `BoxAnnotator` is deprecated and will be removed in `supervision-0.22.0`. Use
import time
# подсчет кол-ва людей за столами (на нашей столовке)
start = time.time()
video_info = sv.VideoInfo.from_video_path('/content/drive/MyDrive/data_sir/video/table_itog.mp4')
polygon = np.array([
[554, 697],[62, 201],[62, 145],[474, 33],[1210, 237],[1210, 689],[558, 693]
zone = sv.PolygonZone(polygon=polygon, frame_resolution_wh=video_info.resolution_wh)
box_annotator = sv.BoxAnnotator(thickness=1, text_thickness=1, text_scale=0.5)
zone_annotator = sv.PolygonZoneAnnotator(zone=zone, color=sv.Color.white(), thickness=3, text_thickness=3, text_scale=2)
with sv.VideoSink(target_path='/content/drive/MyDrive/table_result.mp4', video_info=video_info) as sink:
    for frame in sv.get_video_frames_generator('/content/drive/MyDrive/data_sir/video/table_itog.mp4'):
        cnt += 1
        if cnt%1==0:
             results = model(frame, imgsz=1280)[0]
             detections = sv.Detections.from ultralytics(results)
             detections = detections[detections.class_id == 0]
             zone.trigger(detections=detections)
             print(f'People at the tables {(zone.trigger(detections=detections)==True).sum()}')
             box_annotator = sv.BoxAnnotator(thickness=1, text_thickness=1, text_scale=0.5)
             labels = [f"{model.names[class_id]} {confidence:0.2f}" for confidence, class_id in \
                        zip(detections.confidence, detections.class_id)]
             frame = box_annotator.annotate(scene=frame, detections=detections, labels=labels)
             frame = zone_annotator.annotate(scene=frame)
             sink.write_frame(frame=frame)
end = time.time()
print("The time of execution is :", (end-start), "s")
```

```
Untitled2.ipynb - Colaboratory
 . /JUNIZOU IP PELBULB, Z CUPB, I DOWI, JO CHAILB, 4 UIHIHR CAUTES, I CEII PHOHE, IP
Speed: 3.5ms preprocess, 19.4ms inference, 1.8ms postprocess per image at shape (1, 3, 736, 1280)
People at the tables 18
0: 736x1280 19 persons, 3 cups, 1 bowl, 32 chairs, 4 dining tables, 1 laptop, 1 cell phone, 20.3ms
Speed: 3.8ms preprocess, 20.3ms inference, 2.2ms postprocess per image at shape (1, 3, 736, 1280)
People at the tables 18
SupervisionWarnings: BoxAnnotator is deprecated: `BoxAnnotator` is deprecated and will be removed in `supervision-0.22.0`. Use
SupervisionWarnings: BoxAnnotator is deprecated: `BoxAnnotator` is deprecated and will be removed in `supervision-0.22.0`. Use
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SupervisionWarnings: BoxAnnotator is deprecated: `BoxAnnotator` is deprecated and will be removed in `supervision-0.22.0`. Use
0: 736x1280 19 persons, 3 cups, 1 bowl, 32 chairs, 4 dining tables, 1 cell phone, 20.5 \mathrm{ms}
Speed: 3.8ms preprocess, 20.5ms inference, 1.8ms postprocess per image at shape (1, 3, 736, 1280)
People at the tables 18
0: 736x1280 18 persons, 2 cups, 1 bowl, 32 chairs, 4 dining tables, 1 cell phone, 20.1ms
Speed: 5.6ms preprocess, 20.1ms inference, 1.6ms postprocess per image at shape (1, 3, 736, 1280)
People at the tables 18
0: 736x1280 19 persons, 2 cups, 1 bowl, 34 chairs, 3 dining tables, 1 cell phone, 20.1ms
Speed: 5.9ms preprocess, 20.1ms inference, 2.5ms postprocess per image at shape (1, 3, 736, 1280)
People at the tables 19
0: 736x1280 20 persons, 2 cups, 1 bowl, 33 chairs, 3 dining tables, 1 cell phone, 20.0ms
Speed: 4.7ms preprocess, 20.0ms inference, 1.8ms postprocess per image at shape (1, 3, 736, 1280)
People at the tables 19
SupervisionWarnings: BoxAnnotator is deprecated: `BoxAnnotator` is deprecated and will be removed in `supervision-0.22.0`. Use
SupervisionWarnings: BoxAnnotator is deprecated: `BoxAnnotator` is deprecated and will be removed in `supervision-0.22.0`. Use
SupervisionWarnings: BoxAnnotator is deprecated: `BoxAnnotator` is deprecated and will be removed in `supervision-0.22.0`. Use
SupervisionWarnings: BoxAnnotator is deprecated: `BoxAnnotator` is deprecated and will be removed in `supervision-0.22.0`. Use
0: 736x1280 19 persons, 1 handbag, 2 cups, 1 bowl, 34 chairs, 3 dining tables, 1 cell phone, 19.9ms
Speed: 5.7ms preprocess, 19.9ms inference, 3.6ms postprocess per image at shape (1, 3, 736, 1280)
People at the tables 19
0: 736x1280 19 persons, 1 handbag, 2 cups, 1 bowl, 34 chairs, 3 dining tables, 1 cell phone, 21.7ms
Speed: 3.6ms preprocess, 21.7ms inference, 1.7ms postprocess per image at shape (1, 3, 736, 1280)
People at the tables 19
0: 736x1280 19 persons, 2 cups, 1 bowl, 32 chairs, 3 dining tables, 1 cell phone, 19.6ms
Speed: 4.8ms preprocess, 19.6ms inference, 1.7ms postprocess per image at shape (1, 3, 736, 1280)
People at the tables 19
0: 736x1280 20 persons, 1 handbag, 2 cups, 1 bowl, 32 chairs, 3 dining tables, 1 cell phone, 19.6ms
Speed: 3.5ms preprocess, 19.6ms inference, 2.3ms postprocess per image at shape (1, 3, 736, 1280)
```