```
print("Question 2")
```

```
Question 2
```

```
!pip install kaggle
```

```
Requirement already satisfied: kaggle in /usr/local/lib/python3.10/dist-packages (1.5.16)
Requirement already satisfied: six>=1.10 in /usr/local/lib/python3.10/dist-packages (from kaggle) (1.16.0)
Requirement already satisfied: certifi in /usr/local/lib/python3.10/dist-packages (from kaggle) (2023.7.22)
Requirement already satisfied: python-dateutil in /usr/local/lib/python3.10/dist-packages (from kaggle) (2.8.2)
Requirement already satisfied: requests in /usr/local/lib/python3.10/dist-packages (from kaggle) (2.31.0)
Requirement already satisfied: tqdm in /usr/local/lib/python3.10/dist-packages (from kaggle) (4.66.1)
Requirement already satisfied: python-slugify in /usr/local/lib/python3.10/dist-packages (from kaggle) (8.0.1)
Requirement already satisfied: urllib3 in /usr/local/lib/python3.10/dist-packages (from kaggle) (2.0.4)
Requirement already satisfied: bleach in /usr/local/lib/python3.10/dist-packages (from kaggle) (6.0.0)
Requirement already satisfied: webencodings in /usr/local/lib/python3.10/dist-packages (from bleach->kaggle) (0.5.1)
Requirement already satisfied: text-unidecode>=1.3 in /usr/local/lib/python3.10/dist-packages (from python-slugify->kaggle) (1.3)
Requirement already satisfied: charset-normalizer<4,>=2 in /usr/local/lib/python3.10/dist-packages (from requests->kaggle) (3.2.0)
Requirement already satisfied: idna<4,>=2.5 in /usr/local/lib/python3.10/dist-packages (from requests->kaggle) (3.4)
```

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

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

```
! pip install -q kaggle
```

```
! mkdir ~/.kaggle
```

```
mkdir: cannot create directory ‘/root/.kaggle’: File exists
```

```
!cp /content/drive/MyDrive/timepass/Kaggle/kaggle.json ~/.kaggle/kaggle.json
```

```
! chmod 600 ~/.kaggle/kaggle.json
```

```
! kaggle datasets list
```

```
ref                                                         title                                         size  lastUpdated
----------------------------------------------------------  --------------------------------------------  -----  -------------------
nelgiriyewithana/top-spotify-songs-2023                     Most Streamed Spotify Songs 2023               47KB  2023-08-26 11:04:57
joebeachcapital/students-performance                        Students Performance                            2KB  2023-08-31 00:50:11
carlmcbrideellis/zzzs-lightweight-training-dataset-target  Zzzs: Lightweight training dataset + target  185MB  2023-09-20 19:52:40
iamsouravbanerjee/airline-dataset                           Airline Dataset                                 8MB  2023-09-13 06:47:17
luisgilch/stock-data-with-industry-information              Stock Data with Industry Information            6MB  2023-09-15 20:53:12
josephinelsy/spotify-top-hit-playlist-2010-2022             Spotify Top Hit Playlist (2010-2022)          210KB  2023-09-08 06:11:44
nelgiriyewithana/global-youtube-statistics-2023             Global YouTube Statistics 2023                 60KB  2023-07-28 15:36:38
nelgiriyewithana/credit-card-fraud-detection-dataset-2023   Credit Card Fraud Detection Dataset 2023      143MB  2023-09-18 10:00:19
computingvictor/top1000youtubers                            Top 1000 Youtubers statistics                  43KB  2023-09-17 19:47:18
samiatisha/world-university-rankings-2023-clean-dataset     World University Rankings 2023 - Cleaned      237KB  2023-09-10 15:22:54
lasaljaywardena/global-cryptocurrency-price-database        Global Crypto Currency Price Database         161MB  2023-09-21 00:46:53
harshalhonde/starbucks-reviews-dataset                      Starbucks Reviews Dataset                     170KB  2023-09-15 08:21:59
tawfikelmetwally/employee-dataset                           Employee dataset                               19KB  2023-09-06 18:15:55
farahalarbeed/car-prices-jordan                             Car Prices Jordan 2023                          5KB  2023-09-14 10:17:03
alitaqi000/world-university-rankings-2023                   World University Rankings 2023                 70KB  2023-08-31 14:35:38
meeratif/spotify-most-streamed-artists-of-all-time          Spotify Stats 🎵                                67KB  2023-09-10 11:22:4
sujaykapadnis/cancer-database                               Cancer database                               104KB  2023-09-13 16:41:43
mohammadrizwansajjad/top-200-movies-of-2023                 Top 200 Movies of 2023 Dataset                  6KB  2023-08-31 04:40:32
zsinghrahulk/international-iq-by-countries                  International IQ                                2KB  2023-09-15 08:56:38
muhammadtalhaawan/world-export-and-import-dataset           World Export & Import Dataset (1989 - 2023)   721KB  2023-09-09 18:59:41
```

```
!kaggle datasets download -d robikscube/driving-video-with-object-tracking
```

```
Downloading driving-video-with-object-tracking.zip to /content
100% 18.6G/18.6G [04:48<00:00, 109MB/s]
100% 18.6G/18.6G [04:48<00:00, 69.0MB/s]
```

```
import numpy as np
import pandas as pd
import os
for dirname, _, filenames in os.walk('/kaggle/input'):
    for filename in filenames:
        print(os.path.join(dirname, filename))
```

```
!pip install opencv-python-headless tensorflow
```

```
Requirement already satisfied: opencv-python-headless in /usr/local/lib/python3.10/dist-packages (4.8.0.76)
Requirement already satisfied: tensorflow in /usr/local/lib/python3.10/dist-packages (2.13.0)
```

```
Requirement already satisfied: numpy>=1.21.2 in /usr/local/lib/python3.10/dist-packages (from opencv-python-headless) (1.23.5)
Requirement already satisfied: absl-py>=1.0.0 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (1.4.0)
Requirement already satisfied: astunparse>=1.6.0 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (1.6.3)
Requirement already satisfied: flatbuffers>=23.1.21 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (23.5.26)
Requirement already satisfied: gast<=0.4.0,>=0.2.1 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (0.4.0)
Requirement already satisfied: google-pasta>=0.1.1 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (0.2.0)
Requirement already satisfied: grpcio<2.0,>=1.24.3 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (1.57.0)
Requirement already satisfied: h5py>=2.9.0 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (3.9.0)
Requirement already satisfied: keras<2.14,>=2.13.1 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (2.13.1)
Requirement already satisfied: libclang>=13.0.0 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (16.0.6)
Requirement already satisfied: opt-einsum>=2.3.2 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (3.3.0)
Requirement already satisfied: packaging in /usr/local/lib/python3.10/dist-packages (from tensorflow) (23.1)
Requirement already satisfied: protobuf!=4.21.0,!=4.21.1,!=4.21.2,!=4.21.3,!=4.21.4,!=4.21.5,<5.0.0dev,>=3.20.3 in /usr/local/lib/p
Requirement already satisfied: setuptools in /usr/local/lib/python3.10/dist-packages (from tensorflow) (67.7.2)
Requirement already satisfied: six>=1.12.0 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (1.16.0)
Requirement already satisfied: tensorboard<2.14,>=2.13 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (2.13.0)
Requirement already satisfied: tensorflow-estimator<2.14,>=2.13.0 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (2.1
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Requirement already satisfied: typing-extensions<4.6.0,>=3.6.6 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (4.5.0)
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Requirement already satisfied: wheel<1.0,>=0.23.0 in /usr/local/lib/python3.10/dist-packages (from astunparse>=1.6.0->tensorflow) (
Requirement already satisfied: google-auth<3,>=1.6.3 in /usr/local/lib/python3.10/dist-packages (from tensorboard<2.14,>=2.13->tens
Requirement already satisfied: google-auth-oauthlib<1.1,>=0.5 in /usr/local/lib/python3.10/dist-packages (from tensorboard<2.14,>=2
Requirement already satisfied: markdown>=2.6.8 in /usr/local/lib/python3.10/dist-packages (from tensorboard<2.14,>=2.13->tensorflow
Requirement already satisfied: requests<3,>=2.21.0 in /usr/local/lib/python3.10/dist-packages (from tensorboard<2.14,>=2.13->tensor
Requirement already satisfied: tensorboard-data-server<0.8.0,>=0.7.0 in /usr/local/lib/python3.10/dist-packages (from tensorboard<2
Requirement already satisfied: werkzeug>=1.0.1 in /usr/local/lib/python3.10/dist-packages (from tensorboard<2.14,>=2.13->tensorflow
Requirement already satisfied: cachetools<6.0,>=2.0.0 in /usr/local/lib/python3.10/dist-packages (from google-auth<3,>=1.6.3->tensor
Requirement already satisfied: pyasn1-modules>=0.2.1 in /usr/local/lib/python3.10/dist-packages (from google-auth<3,>=1.6.3->tensor
Requirement already satisfied: rsa<5,>=3.1.4 in /usr/local/lib/python3.10/dist-packages (from google-auth<3,>=1.6.3->tensorboard<2
Requirement already satisfied: requests-oauthlib>=0.7.0 in /usr/local/lib/python3.10/dist-packages (from google-auth-oauthlib<1.1,>
Requirement already satisfied: charset-normalizer<4,>=2 in /usr/local/lib/python3.10/dist-packages (from requests<3,>=2.21.0->tensor
Requirement already satisfied: idna<4,>=2.5 in /usr/local/lib/python3.10/dist-packages (from requests<3,>=2.21.0->tensorboard<2.14,
Requirement already satisfied: urllib3<3,>=1.21.1 in /usr/local/lib/python3.10/dist-packages (from requests<3,>=2.21.0->tensorboard
Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.10/dist-packages (from requests<3,>=2.21.0->tensorboard
Requirement already satisfied: MarkupSafe>=2.1.1 in /usr/local/lib/python3.10/dist-packages (from werkzeug>=1.0.1->tensorboard<2.14
Requirement already satisfied: pyasn1<0.6.0,>=0.4.6 in /usr/local/lib/python3.10/dist-packages (from pyasn1-modules>=0.2.1->google-
Requirement already satisfied: oauthlib>=3.0.0 in /usr/local/lib/python3.10/dist-packages (from requests-oauthlib>=0.7.0->google-au
```

```
import os
import cv2
import numpy as np
import tensorflow as tf
import zipfile

# Mount Google Drive (if your videos are stored in Google Drive)
from google.colab import drive
drive.mount('/content/drive')

# Path to the pre-trained object detection model
model_path = 'path_to_model_directory'  # Replace with your model path
output_path = '/content/output_videos'   # Output directory for processed videos
zip_file_path = '/content/driving-video-with-object-tracking.zip'  # Path to the ZIP file
unzip_dir = '/content/unzipped_videos'   # Directory to unzip the videos

# Create the output directory if it doesn't exist
os.makedirs(output_path, exist_ok=True)

# Function to preprocess a frame (replace with your preprocessing logic)
def preprocess(frame):
    # Your preprocessing code here
    return frame

# Function to draw bounding boxes (replace with your drawing logic)
def draw_boxes(frame, detections):
    # Your drawing code here
    return frame

# Extract the ZIP file containing videos
with zipfile.ZipFile(zip_file_path, 'r') as zip_ref:
    zip_ref.extractall(unzip_dir)

# List all video files in the unzipped directory
video_files = [f for f in os.listdir(unzip_dir) if f.endswith('.mov')]
```

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

```
!pip install opencv-python-headless tensorflow pandas pyarrow
```

```
Requirement already satisfied: opencv-python-headless in /usr/local/lib/python3.10/dist-packages (4.8.0.76)
Requirement already satisfied: tensorflow in /usr/local/lib/python3.10/dist-packages (2.13.0)
Requirement already satisfied: pandas in /usr/local/lib/python3.10/dist-packages (1.5.3)
Requirement already satisfied: pyarrow in /usr/local/lib/python3.10/dist-packages (9.0.0)
Requirement already satisfied: numpy>=1.21.2 in /usr/local/lib/python3.10/dist-packages (from opencv-python-headless) (1.23.5)
Requirement already satisfied: absl-py>=1.0.0 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (1.4.0)
Requirement already satisfied: astunparse>=1.6.0 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (1.6.3)
Requirement already satisfied: flatbuffers>=23.1.21 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (23.5.26)
Requirement already satisfied: gast<=0.4.0,>=0.2.1 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (0.4.0)
Requirement already satisfied: google-pasta>=0.1.1 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (0.2.0)
Requirement already satisfied: grpcio<2.0,>=1.24.3 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (1.57.0)
Requirement already satisfied: h5py>=2.9.0 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (3.9.0)
Requirement already satisfied: keras<2.14,>=2.13.1 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (2.13.1)
Requirement already satisfied: libclang>=13.0.0 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (16.0.6)
Requirement already satisfied: opt-einsum>=2.3.2 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (3.3.0)
Requirement already satisfied: packaging in /usr/local/lib/python3.10/dist-packages (from tensorflow) (23.1)
Requirement already satisfied: protobuf!=4.21.0,!=4.21.1,!=4.21.2,!=4.21.3,!=4.21.4,!=4.21.5,<5.0.0dev,>=3.20.3 in /usr/local/lib/p
Requirement already satisfied: setuptools in /usr/local/lib/python3.10/dist-packages (from tensorflow) (67.7.2)
Requirement already satisfied: six>=1.12.0 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (1.16.0)
Requirement already satisfied: tensorboard<2.14,>=2.13 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (2.13.0)
Requirement already satisfied: tensorflow-estimator<2.14,>=2.13.0 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (2.1
Requirement already satisfied: termcolor>=1.1.0 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (2.3.0)
Requirement already satisfied: typing-extensions<4.6.0,>=3.6.6 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (4.5.0)
Requirement already satisfied: wrapt>=1.11.0 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (1.15.0)
Requirement already satisfied: tensorflow-io-gcs-filesystem>=0.23.1 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (0
Requirement already satisfied: python-dateutil>=2.8.1 in /usr/local/lib/python3.10/dist-packages (from pandas) (2.8.2)
Requirement already satisfied: pytz>=2020.1 in /usr/local/lib/python3.10/dist-packages (from pandas) (2023.3.post1)
Requirement already satisfied: wheel<1.0,>=0.23.0 in /usr/local/lib/python3.10/dist-packages (from astunparse>=1.6.0->tensorflow) (
Requirement already satisfied: google-auth<3,>=1.6.3 in /usr/local/lib/python3.10/dist-packages (from tensorboard<2.14,>=2.13->tens
Requirement already satisfied: google-auth-oauthlib<1.1,>=0.5 in /usr/local/lib/python3.10/dist-packages (from tensorboard<2.14,>=2
Requirement already satisfied: markdown>=2.6.8 in /usr/local/lib/python3.10/dist-packages (from tensorboard<2.14,>=2.13->tensorflow
Requirement already satisfied: requests<3,>=2.21.0 in /usr/local/lib/python3.10/dist-packages (from tensorboard<2.14,>=2.13->tensor
Requirement already satisfied: tensorboard-data-server<0.8.0,>=0.7.0 in /usr/local/lib/python3.10/dist-packages (from tensorboard<2
Requirement already satisfied: werkzeug>=1.0.1 in /usr/local/lib/python3.10/dist-packages (from tensorboard<2.14,>=2.13->tensorflow
Requirement already satisfied: cachetools<6.0,>=2.0.0 in /usr/local/lib/python3.10/dist-packages (from google-auth<3,>=1.6.3->tensc
Requirement already satisfied: pyasn1-modules>=0.2.1 in /usr/local/lib/python3.10/dist-packages (from google-auth<3,>=1.6.3->tensor
Requirement already satisfied: rsa<5,>=3.1.4 in /usr/local/lib/python3.10/dist-packages (from google-auth<3,>=1.6.3->tensorboard<2
Requirement already satisfied: requests-oauthlib>=0.7.0 in /usr/local/lib/python3.10/dist-packages (from google-auth-oauthlib<1.1,>
Requirement already satisfied: charset-normalizer<4,>=2 in /usr/local/lib/python3.10/dist-packages (from requests<3,>=2.21.0->tensc
Requirement already satisfied: idna<4,>=2.5 in /usr/local/lib/python3.10/dist-packages (from requests<3,>=2.21.0->tensorboard<2.14,
Requirement already satisfied: urllib3<3,>=1.21.1 in /usr/local/lib/python3.10/dist-packages (from requests<3,>=2.21.0->tensorboard
Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.10/dist-packages (from requests<3,>=2.21.0->tensorboard
Requirement already satisfied: MarkupSafe>=2.1.1 in /usr/local/lib/python3.10/dist-packages (from werkzeug>=1.0.1->tensorboard<2.14
Requirement already satisfied: pyasn1<0.6.0,>=0.4.6 in /usr/local/lib/python3.10/dist-packages (from pyasn1-modules>=0.2.1->google-
Requirement already satisfied: oauthlib>=3.0.0 in /usr/local/lib/python3.10/dist-packages (from requests-oauthlib>=0.7.0->google-au
```

```
import os
import cv2
import numpy as np
import pandas as pd
import tensorflow as tf
from object_detection.utils import config_util
from object_detection.builders import model_builder
from object_detection.utils import visualization_utils as viz_utils
from object_detection.utils import label_map_util

# Define paths to your data and model
video_dir = '/content/unzipped_videos/bdd100k_videos_train_00/bdd100k/videos/train'
label_file_csv = '/content/unzipped_videos/mot_labels.csv'
label_file_parquet = '/content/unzipped_videos/mot_labels.parquet'
model_dir = '/content/unzipped_videos'

# Create a label map and load labels (if available)
label_map_path = 'path_to_label_map.pbtxt'  # You'll need to create this file
label_map = label_map_util.load_labelmap(label_map_path)
categories = label_map_util.convert_label_map_to_categories(label_map, max_num_classes=90)
category_index = label_map_util.create_category_index(categories)

# Load your video data
video_files = [f for f in os.listdir(video_dir) if f.endswith('.mov')]

# Load your annotations (labels)
annotations_csv = pd.read_csv(label_file_csv)
annotations_parquet = pd.read_parquet(label_file_parquet)

# Load a pre-trained object detection model
def load_model(model_dir):
    # Load pipeline config and build detection model
    pipeline_config = os.path.join(model_dir, 'pipeline.config')
    configs = config_util.get_configs_from_pipeline_file(pipeline_config)
    model_config = configs['model']
    detection_model = model_builder.build(model_config=model_config, is_training=False)

    # Restore checkpoint
```

```
    ckpt = tf.compat.v2.train.Checkpoint(model=detection_model)
    ckpt.restore(os.path.join(model_dir, 'checkpoint', 'ckpt-0')).expect_partial()

    return detection_model

detection_model = load_model(model_dir)

# Function to perform object detection on a frame
def detect_objects(frame):
    input_tensor = tf.convert_to_tensor(np.expand_dims(frame, 0))
    detections = detection_model(input_tensor)
    return detections

# Function to draw bounding boxes on a frame
def draw_boxes_on_frame(frame, detections):
    viz_utils.visualize_boxes_and_labels_on_image_array(
        frame,
        detections['detection_boxes'][0].numpy(),
        detections['detection_classes'][0].numpy().astype(np.int32),
        detections['detection_scores'][0].numpy(),
        category_index,
        use_normalized_coordinates=True,
        max_boxes_to_draw=200,  # Adjust as needed
        min_score_thresh=0.30,  # Adjust as needed
        agnostic_mode=False)
    return frame

# Function to process and save a video
def process_and_save_video(input_video_path, output_video_path):
    cap = cv2.VideoCapture(input_video_path)
    frame_width = int(cap.get(3))
    frame_height = int(cap.get(4))
    out = cv2.VideoWriter(output_video_path, cv2.VideoWriter_fourcc(*'XVID'), 30, (frame_width, frame_height))

    while cap.isOpened():
        ret, frame = cap.read()
        if not ret:
            break

        # Perform object detection on the frame
        detections = detect_objects(frame)

        # Draw bounding boxes on the frame
        frame_with_boxes = draw_boxes_on_frame(frame, detections)

        # Write the frame with bounding boxes to the output video
        out.write(frame_with_boxes)

    cap.release()
    out.release()

# Process and save each video
for video_file in video_files:
    input_video_path = os.path.join(video_dir, video_file)
    output_video_path = os.path.join(output_path, video_file)
    process_and_save_video(input_video_path, output_video_path)
```

```
!pip install opencv-python-headless numpy tensorflow
```

```
Requirement already satisfied: opencv-python-headless in /usr/local/lib/python3.10/dist-packages (4.8.0.76)
Requirement already satisfied: numpy in /usr/local/lib/python3.10/dist-packages (1.23.5)
Requirement already satisfied: tensorflow in /usr/local/lib/python3.10/dist-packages (2.8.3)
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Requirement already satisfied: opt-einsum>=2.3.2 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (3.3.0)
Requirement already satisfied: protobuf<3.20,>=3.9.2 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (3.19.6)
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Requirement already satisfied: six>=1.12.0 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (1.16.0)
Requirement already satisfied: termcolor>=1.1.0 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (2.3.0)
Requirement already satisfied: typing-extensions>=3.6.6 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (4.5.0)
Requirement already satisfied: wrapt>=1.11.0 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (1.15.0)
Requirement already satisfied: tensorboard<2.9,>=2.8 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (2.8.0)
Requirement already satisfied: tensorflow-estimator<2.9,>=2.8 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (2.8.0)
Requirement already satisfied: keras<2.9,>=2.8.0rc0 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (2.8.0)
Requirement already satisfied: tensorflow-io-gcs-filesystem>=0.23.1 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (0
```

```
Requirement already satisfied: grpcio<2.0,>=1.24.3 in /usr/local/lib/python3.10/dist-packages (from tensorflow) (1.57.0)
Requirement already satisfied: wheel<1.0,>=0.23.0 in /usr/local/lib/python3.10/dist-packages (from astunparse>=1.6.0->tensorflow) (
Requirement already satisfied: google-auth<3,>=1.6.3 in /usr/local/lib/python3.10/dist-packages (from tensorboard<2.9,>=2.8->tensor
Requirement already satisfied: google-auth-oauthlib<0.5,>=0.4.1 in /usr/local/lib/python3.10/dist-packages (from tensorboard<2.9,>=
Requirement already satisfied: markdown>=2.6.8 in /usr/local/lib/python3.10/dist-packages (from tensorboard<2.9,>=2.8->tensorflow)
Requirement already satisfied: requests<3,>=2.21.0 in /usr/local/lib/python3.10/dist-packages (from tensorboard<2.9,>=2.8->tensorfl
Requirement already satisfied: tensorboard-data-server<0.7.0,>=0.6.0 in /usr/local/lib/python3.10/dist-packages (from tensorboard<2
Requirement already satisfied: tensorboard-plugin-wit>=1.6.0 in /usr/local/lib/python3.10/dist-packages (from tensorboard<2.9,>=2.8
Requirement already satisfied: werkzeug>=0.11.15 in /usr/local/lib/python3.10/dist-packages (from tensorboard<2.9,>=2.8->tensorflow
Requirement already satisfied: cachetools<6.0,>=2.0.0 in /usr/local/lib/python3.10/dist-packages (from google-auth<3,>=1.6.3->tensor
Requirement already satisfied: pyasn1-modules>=0.2.1 in /usr/local/lib/python3.10/dist-packages (from google-auth<3,>=1.6.3->tensor
Requirement already satisfied: rsa<5,>=3.1.4 in /usr/local/lib/python3.10/dist-packages (from google-auth<3,>=1.6.3->tensorboard<2
Requirement already satisfied: requests-oauthlib>=0.7.0 in /usr/local/lib/python3.10/dist-packages (from google-auth-oauthlib<0.5,>
Requirement already satisfied: charset-normalizer<4,>=2 in /usr/local/lib/python3.10/dist-packages (from requests<3,>=2.21.0->tensor
Requirement already satisfied: idna<4,>=2.5 in /usr/local/lib/python3.10/dist-packages (from requests<3,>=2.21.0->tensorboard<2.9,>
Requirement already satisfied: urllib3<3,>=1.21.1 in /usr/local/lib/python3.10/dist-packages (from requests<3,>=2.21.0->tensorboard
Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.10/dist-packages (from requests<3,>=2.21.0->tensorboard
Requirement already satisfied: MarkupSafe>=2.1.1 in /usr/local/lib/python3.10/dist-packages (from werkzeug>=0.11.15->tensorboard<2
Requirement already satisfied: pyasn1<0.6.0,>=0.4.6 in /usr/local/lib/python3.10/dist-packages (from pyasn1-modules>=0.2.1->google-
Requirement already satisfied: oauthlib>=3.0.0 in /usr/local/lib/python3.10/dist-packages (from requests-oauthlib>=0.7.0->google-au
```

```
import os

output_folder = "/content/output_videos"
os.makedirs(output_folder, exist_ok=True)
```

```
!pip install opencv-python-headless numpy
```

```
Requirement already satisfied: opencv-python-headless in /usr/local/lib/python3.10/dist-packages (4.8.0.76)
Requirement already satisfied: numpy in /usr/local/lib/python3.10/dist-packages (1.23.5)
```

```
import cv2
import numpy as np

# Load YOLOv4 model
net = cv2.dnn.readNet("yolov4.weights", "yolov4.cfg")

# Load class names
classes = []
with open("coco.names", "r") as f:
    classes = f.read().strip().split("\n")

# Input and output paths
input_folder = "/content/unzipped_videos/bdd100k_videos_train_00/bdd100k/videos/train/"
output_folder = "/content/output_videos"

# Process each video
for video_file in os.listdir(input_folder):
    input_video_path = os.path.join(input_folder, video_file)
    output_video_path = os.path.join(output_folder, f"processed_{video_file}")

    cap = cv2.VideoCapture(input_video_path)

    # Get video properties
    frame_width = int(cap.get(3))
    frame_height = int(cap.get(4))
    fps = int(cap.get(5))

    # Define the codec and create a VideoWriter object
    fourcc = cv2.VideoWriter_fourcc(*'mp4v')
    out = cv2.VideoWriter(output_video_path, fourcc, fps, (frame_width, frame_height))

    while True:
        ret, frame = cap.read()
        if not ret:
            break

        blob = cv2.dnn.blobFromImage(frame, 1 / 255.0, (416, 416), swapRB=True, crop=False)
        net.setInput(blob)

        # Perform object detection
        layer_names = net.getUnconnectedOutLayersNames()
        detections = net.forward(layer_names)

        # Process detections and draw bounding boxes (similar to previous example)
        # ...

        # Write the frame with bounding boxes to the output video
        out.write(frame)
```

```
    # Release video objects
    cap.release()
    out.release()

# Close all OpenCV windows
cv2.destroyAllWindows()
```

```
!pip install ultralytics -q
```

```
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```

```
import zipfile

# Specify the path to the ZIP file you want to unzip
zip_file_path = '/content/driving-video-with-object-tracking.zip'

# Specify the directory where you want to extract the contents
extracted_dir_path = '/content/'

# Use the zipfile module to extract the contents
with zipfile.ZipFile(zip_file_path, 'r') as zip_ref:
    zip_ref.extractall(extracted_dir_path)
```

```
# Install Darknet (adjust based on your YOLO version)
!git clone https://github.com/AlexeyAB/darknet.git
%cd darknet
!make

# Install OpenCV
!pip install opencv-python
```

```
gcc -Iinclude/ -I3rdparty/stb/include -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC -rdynamic -Ofast -c ./s
gcc -Iinclude/ -I3rdparty/stb/include -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC -rdynamic -Ofast -c ./s
gcc -Iinclude/ -I3rdparty/stb/include -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC -rdynamic -Ofast -c ./s
gcc -Iinclude/ -I3rdparty/stb/include -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC -rdynamic -Ofast -c ./s
g++ -std=c++11 -std=c++11 -Iinclude/ -I3rdparty/stb/include -Wall -Wfatal-errors -Wno-unused-result -Wno-unknown-pragmas -fPIC -
Requirement already satisfied: opencv-python in /usr/local/lib/python3.10/dist-packages (4.8.0.76)
Requirement already satisfied: numpy>=1.21.2 in /usr/local/lib/python3.10/dist-packages (from opencv-python) (1.23.5)
```

```
import os

video_directory = "/content/bdd100k_videos_train_00/bdd100k/videos/train"
video_files = os.listdir(video_directory)
selected_videos = video_files[:20]  # Adjust the slice to select the first 20 videos

# Create a list of full paths to the selected videos
video_paths = [os.path.join(video_directory, video) for video in selected_videos]
```

```
import os
import cv2
import subprocess

# Define the path to your YOLO model
model_path = "yolov8m.pt"

# Define the directory containing the videos
video_directory = "/content/bdd100k_videos_train_00/bdd100k/videos/train"

# Define the output directory for processed videos
output_directory = "/content/output_videos"
os.makedirs(output_directory, exist_ok=True)

# List all video files in the directory
video_files = os.listdir(video_directory)

# Select the first 20 videos (adjust as needed)
selected_videos = video_files[:20]

# Loop through the selected videos
for video_file in selected_videos:
    video_path = os.path.join(video_directory, video_file)

    # Define the output video file path
    output_path = os.path.join(output_directory, os.path.basename(video_file))

    # Define the YOLO command
    yolo_command = f"!yolo detect predict model={model_path} source={video_path} output={output_path}"

    # Run the YOLO command using subprocess
    subprocess.run(yolo_command, shell=True)

    # Create a command to add libx264 codec using FFmpeg
    ffmpeg_command = f"!ffmpeg -i {output_path} -vcodec libx264 {os.path.join(output_directory, 'vid_' + os.path.basename(output_path))}

    # Run the FFmpeg command using subprocess
    subprocess.run(ffmpeg_command, shell=True)


# Release all resources
cv2.destroyAllWindows()
```

```
!yolo detect predict model=yolov8m.pt source="/content/drive/MyDrive/timepass/video"
```

```
/bin/bash: line 1: yolo: command not found
```

```
!pip install ultralytics -q
```

```
━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 618.1/618.1 kB 6.4 MB/s eta 0:00:00
```

```
!yolo detect predict model=yolov8m.pt source="/content/drive/MyDrive/timepass/video"
```

```
video 10/23 (1076/1204) /content/drive/MyDrive/timepass/video/18.mov: 384x640 7 cars, 799.1ms
video 10/23 (1077/1204) /content/drive/MyDrive/timepass/video/18.mov: 384x640 7 cars, 812.8ms
video 10/23 (1078/1204) /content/drive/MyDrive/timepass/video/18.mov: 384x640 8 cars, 813.5ms
video 10/23 (1079/1204) /content/drive/MyDrive/timepass/video/18.mov: 384x640 8 cars, 841.5ms
video 10/23 (1080/1204) /content/drive/MyDrive/timepass/video/18.mov: 384x640 6 cars, 839.0ms
video 10/23 (1081/1204) /content/drive/MyDrive/timepass/video/18.mov: 384x640 7 cars, 819.1ms
video 10/23 (1082/1204) /content/drive/MyDrive/timepass/video/18.mov: 384x640 8 cars, 1312.1ms
video 10/23 (1083/1204) /content/drive/MyDrive/timepass/video/18.mov: 384x640 7 cars, 1336.3ms
video 10/23 (1084/1204) /content/drive/MyDrive/timepass/video/18.mov: 384x640 1 person, 8 cars, 1189.5ms
video 10/23 (1085/1204) /content/drive/MyDrive/timepass/video/18.mov: 384x640 1 person, 8 cars, 826.3ms
video 10/23 (1086/1204) /content/drive/MyDrive/timepass/video/18.mov: 384x640 8 cars, 856.1ms
video 10/23 (1087/1204) /content/drive/MyDrive/timepass/video/18.mov: 384x640 7 cars, 842.9ms
video 10/23 (1088/1204) /content/drive/MyDrive/timepass/video/18.mov: 384x640 5 cars, 847.5ms
video 10/23 (1089/1204) /content/drive/MyDrive/timepass/video/18.mov: 384x640 5 cars, 804.3ms
video 10/23 (1090/1204) /content/drive/MyDrive/timepass/video/18.mov: 384x640 5 cars, 833.0ms
video 10/23 (1091/1204) /content/drive/MyDrive/timepass/video/18.mov: 384x640 4 cars, 1 traffic light, 842.1ms
video 10/23 (1092/1204) /content/drive/MyDrive/timepass/video/18.mov: 384x640 5 cars, 1 traffic light, 830.6ms
video 10/23 (1093/1204) /content/drive/MyDrive/timepass/video/18.mov: 384x640 5 cars, 1 traffic light, 831.4ms
video 10/23 (1094/1204) /content/drive/MyDrive/timepass/video/18.mov: 384x640 4 cars, 1 traffic light, 824.6ms
video 10/23 (1095/1204) /content/drive/MyDrive/timepass/video/18.mov: 384x640 6 cars, 822.8ms
video 10/23 (1096/1204) /content/drive/MyDrive/timepass/video/18.mov: 384x640 5 cars, 1146.0ms
video 10/23 (1097/1204) /content/drive/MyDrive/timepass/video/18.mov: 384x640 7 cars, 1341.7ms
video 10/23 (1098/1204) /content/drive/MyDrive/timepass/video/18.mov: 384x640 8 cars, 1324.3ms
video 10/23 (1099/1204) /content/drive/MyDrive/timepass/video/18.mov: 384x640 9 cars, 867.2ms
video 10/23 (1100/1204) /content/drive/MyDrive/timepass/video/18.mov: 384x640 6 cars, 839.3ms
video 10/23 (1101/1204) /content/drive/MyDrive/timepass/video/18.mov: 384x640 8 cars, 839.0ms
video 10/23 (1102/1204) /content/drive/MyDrive/timepass/video/18.mov: 384x640 8 cars, 845.5ms
video 10/23 (1103/1204) /content/drive/MyDrive/timepass/video/18.mov: 384x640 5 cars, 1 traffic light, 832.1ms
video 10/23 (1104/1204) /content/drive/MyDrive/timepass/video/18.mov: 384x640 8 cars, 1 traffic light, 817.4ms
video 10/23 (1105/1204) /content/drive/MyDrive/timepass/video/18.mov: 384x640 9 cars, 1 traffic light, 843.6ms
video 10/23 (1106/1204) /content/drive/MyDrive/timepass/video/18.mov: 384x640 8 cars, 1 traffic light, 844.4ms
video 10/23 (1107/1204) /content/drive/MyDrive/timepass/video/18.mov: 384x640 5 cars, 1 traffic light, 852.2ms
video 10/23 (1108/1204) /content/drive/MyDrive/timepass/video/18.mov: 384x640 7 cars, 1 traffic light, 851.7ms
video 10/23 (1109/1204) /content/drive/MyDrive/timepass/video/18.mov: 384x640 7 cars, 1 traffic light, 852.6ms
video 10/23 (1110/1204) /content/drive/MyDrive/timepass/video/18.mov: 384x640 6 cars, 1 traffic light, 1069.8ms
video 10/23 (1111/1204) /content/drive/MyDrive/timepass/video/18.mov: 384x640 6 cars, 1 traffic light, 1375.6ms
video 10/23 (1112/1204) /content/drive/MyDrive/timepass/video/18.mov: 384x640 7 cars, 1 traffic light, 1503.9ms
video 10/23 (1113/1204) /content/drive/MyDrive/timepass/video/18.mov: 384x640 7 cars, 1 traffic light, 1027.1ms
video 10/23 (1114/1204) /content/drive/MyDrive/timepass/video/18.mov: 384x640 8 cars, 1 traffic light, 856.3ms
[NULL @ 0x58ef9f12e900] Invalid NAL unit size (17162 > 13812).
[NULL @ 0x58ef9f12e900] missing picture in access unit with size 13816
[h264 @ 0x58efa9c872c0] Invalid NAL unit size (17162 > 13812).
[h264 @ 0x58efa9c872c0] Error splitting the input into NAL units.
video 10/23 (1115/1204) /content/drive/MyDrive/timepass/video/18.mov: 384x640 9 cars, 1 traffic light, 927.8ms
[mov,mp4,m4a,3gp,3g2,mj2 @ 0x58ef9f172040] stream 0, offset 0x1170d98: partial file
Speed: 2.7ms preprocess, 929.4ms inference, 1.3ms postprocess per image at shape (1, 3, 384, 640)
Results saved to runs/detect/predict
💡 Learn more at https://docs.ultralytics.com/modes/predict
```

```
!ffmpeg -i {"/content/darknet/runs/detect/predict/1.avi"} -vcodec libx264 {"video1.avi"}
!ffmpeg -i {"/content/darknet/runs/detect/predict/10.avi"} -vcodec libx264 {"video10.avi"}
!ffmpeg -i {"/content/darknet/runs/detect/predict/11.avi"} -vcodec libx264 {"video11.avi"}
!ffmpeg -i {"/content/darknet/runs/detect/predict/12.avi"} -vcodec libx264 {"video12.avi"}
!ffmpeg -i {"/content/darknet/runs/detect/predict/13.avi"} -vcodec libx264 {"video13.avi"}
!ffmpeg -i {"/content/darknet/runs/detect/predict/14.avi"} -vcodec libx264 {"video14.avi"}
!ffmpeg -i {"/content/darknet/runs/detect/predict/15.avi"} -vcodec libx264 {"video15.avi"}
!ffmpeg -i {"/content/darknet/runs/detect/predict/16.avi"} -vcodec libx264 {"video16.avi"}
!ffmpeg -i {"/content/darknet/runs/detect/predict/17.avi"} -vcodec libx264 {"video17.avi"}
!ffmpeg -i {"/content/darknet/runs/detect/predict/18.avi"} -vcodec libx264 {"video18.avi"}
```

```
Output #0, avi, to 'video18.avi':
  Metadata:
    software        : Lavf59.27.100
    ISFT            : Lavf58.76.100
  Stream #0:0: Video: h264 (H264 / 0x34363248), yuvj420p(pc, bt470bg/unknown/unknown, progressive), 1280x720, q=2-31, 29 fps, 29
    Metadata:
      encoder         : Lavc58.134.100 libx264
    Side data:
      cpb: bitrate max/min/avg: 0/0/0 buffer size: 0 vbv_delay: N/A
frame= 1115 fps= 11 q=-1.0 Lsize=   18236kB time=00:00:38.37 bitrate=3892.4kbits/s speed=0.388x
video:18204kB audio:0kB subtitle:0kB other streams:0kB global headers:0kB muxing overhead: 0.176901%
[libx264 @ 0x5ad2932a4340] frame I:5     Avg QP:20.87  size: 45990
[libx264 @ 0x5ad2932a4340] frame P:290   Avg QP:23.37  size: 28296
[libx264 @ 0x5ad2932a4340] frame B:820   Avg QP:24.70  size: 12445
[libx264 @ 0x5ad2932a4340] consecutive B-frames:  0.7%  2.3%  4.0% 92.9%
[libx264 @ 0x5ad2932a4340] mb I  I16..4: 15.6% 76.8%  7.6%
[libx264 @ 0x5ad2932a4340] mb P  I16..4:  8.6% 55.4%  2.2%  P16..4: 17.0%  8.9%  4.2%  0.0%  0.0%    skip: 3.7%
[libx264 @ 0x5ad2932a4340] mb B  I16..4:  3.5% 17.3%  0.4%  B16..8: 32.6%  9.0%  1.9%  direct: 4.7%  skip:30.6%  L0:47.1% L1:44.
[libx264 @ 0x5ad2932a4340] 8x8 transform intra:82.7% inter:77.7%
[libx264 @ 0x5ad2932a4340] coded y,uvDC,uvAC intra: 53.4% 62.9% 3.4% inter: 18.4% 26.6% 3.0%
[libx264 @ 0x5ad2932a4340] i16 v,h,dc,p: 27% 37% 20% 17%
[libx264 @ 0x5ad2932a4340] i8 v,h,dc,ddl,ddr,vr,hd,vl,hu: 24% 27% 41%  2%  1%  1%  1%  1%  2%
[libx264 @ 0x5ad2932a4340] i4 v,h,dc,ddl,ddr,vr,hd,vl,hu: 30% 30% 14%  4%  4%  4%  5%  4%  5%
[libx264 @ 0x5ad2932a4340] i8c dc,h,v,p: 43% 30% 24%  2%
[libx264 @ 0x5ad2932a4340] Weighted P-Frames: Y:7.9% UV:5.5%
[libx264 @ 0x5ad2932a4340] ref P L0: 53.3% 14.1% 22.3%  9.8%  0.5%
[libx264 @ 0x5ad2932a4340] ref B L0: 86.4% 10.8%  2.9%
[libx264 @ 0x5ad2932a4340] ref B L1: 95.1%  4.9%
[libx264 @ 0x5ad2932a4340] kb/s:3878.54
```

```
!ffmpeg -i {"/content/darknet/runs/detect/predict/1.avi"} -vcodec libx264 {"video1.avi"}
```

```
ffmpeg version 4.4.2-0ubuntu0.22.04.1 Copyright (c) 2000-2021 the FFmpeg developers
  built with gcc 11 (Ubuntu 11.2.0-19ubuntu1)
  configuration: --prefix=/usr --extra-version=0ubuntu0.22.04.1 --toolchain=hardened --libdir=/usr/lib/x86_64-linux-gnu --incdir=/u
  libavutil      56. 70.100 / 56. 70.100
  libavcodec     58.134.100 / 58.134.100
  libavformat    58. 76.100 / 58. 76.100
  libavdevice    58. 13.100 / 58. 13.100
  libavfilter     7.110.100 /  7.110.100
  libswscale      5.  9.100 /  5.  9.100
  libswresample   3.  9.100 /  3.  9.100
  libpostproc    55.  9.100 / 55.  9.100
Input #0, avi, from '/content/darknet/runs/detect/predict/1.avi':
  Metadata:
    software        : Lavf59.27.100
  Duration: 00:00:20.51, start: 0.000000, bitrate: 48886 kb/s
  Stream #0:0: Video: mjpeg (Baseline) (MJPG / 0x47504A4D), yuvj420p(pc, bt470bg/unknown/unknown), 1280x720, 48905 kb/s, 59 fps, 59
File 'video1.avi' already exists. Overwrite? [y/N] N
Not overwriting - exiting
```

```
!ffmpeg -i {"/content/darknet/runs/detect/predict/1.avi"} -vcodec libx264 {"/content/drive/MyDrive/timepass/Output/video1.avi"}
```

```
ffmpeg version 4.4.2-0ubuntu0.22.04.1 Copyright (c) 2000-2021 the FFmpeg developers
  built with gcc 11 (Ubuntu 11.2.0-19ubuntu1)
  configuration: --prefix=/usr --extra-version=0ubuntu0.22.04.1 --toolchain=hardened --libdir=/usr/lib/x86_64-linux-gnu --incdir=/u
  libavutil      56. 70.100 / 56. 70.100
  libavcodec     58.134.100 / 58.134.100
  libavformat    58. 76.100 / 58. 76.100
  libavdevice    58. 13.100 / 58. 13.100
  libavfilter     7.110.100 /  7.110.100
  libswscale      5.  9.100 /  5.  9.100
  libswresample   3.  9.100 /  3.  9.100
  libpostproc    55.  9.100 / 55.  9.100
Input #0, avi, from '/content/darknet/runs/detect/predict/1.avi':
  Metadata:
    software        : Lavf59.27.100
  Duration: 00:00:20.51, start: 0.000000, bitrate: 48886 kb/s
  Stream #0:0: Video: mjpeg (Baseline) (MJPG / 0x47504A4D), yuvj420p(pc, bt470bg/unknown/unknown), 1280x720, 48905 kb/s, 59 fps, 59
Stream mapping:
  Stream #0:0 -> #0:0 (mjpeg (native) -> h264 (libx264))
Press [q] to stop, [?] for help
[libx264 @ 0x5d19e10dab40] using cpu capabilities: MMX2 SSE2Fast SSSE3 SSE4.2 AVX FMA3 BMI2 AVX2
[libx264 @ 0x5d19e10dab40] profile High, level 3.2, 4:2:0, 8-bit
Output #0, avi, to '/content/drive/MyDrive/timepass/Output/video1.avi':
  Metadata:
    software        : Lavf59.27.100
    ISFT            : Lavf58.76.100
  Stream #0:0: Video: h264 (H264 / 0x34363248), yuvj420p(pc, bt470bg/unknown/unknown, progressive), 1280x720, q=2-31, 59 fps, 59 tb
    Metadata:
      encoder         : Lavc58.134.100 libx264
    Side data:
      cpb: bitrate max/min/avg: 0/0/0 buffer size: 0 vbv_delay: N/A
frame= 1210 fps= 13 q=-1.0 Lsize=   12209kB time=00:00:20.47 bitrate=4884.7kbits/s speed=0.226x
video:12174kB audio:0kB subtitle:0kB other streams:0kB global headers:0kB muxing overhead: 0.283630%
```

```
[libx264 @ 0x5d19e10dab40] frame I:5     Avg QP:24.48  size: 50487
[libx264 @ 0x5d19e10dab40] frame P:305   Avg QP:26.73  size: 19057
[libx264 @ 0x5d19e10dab40] frame B:900   Avg QP:29.43  size:  7113
[libx264 @ 0x5d19e10dab40] consecutive B-frames:  0.6%  0.3%  1.2% 97.9%
[libx264 @ 0x5d19e10dab40] mb I  I16..4: 16.3% 72.6% 11.1%
[libx264 @ 0x5d19e10dab40] mb P  I16..4:  9.4% 19.4%  1.9%  P16..4: 34.3% 11.0%  4.8%  0.0%  0.0%    skip:19.2%
[libx264 @ 0x5d19e10dab40] mb B  I16..4:  1.6%  2.6%  0.2%  B16..8: 44.1%  7.0%  1.3%  direct: 1.2%  skip:42.0%  L0:46.3% L1:49.1%
[libx264 @ 0x5d19e10dab40] 8x8 transform intra:62.5% inter:82.6%
[libx264 @ 0x5d19e10dab40] coded y,uvDC,uvAC intra: 41.5% 43.6% 5.7% inter: 11.5% 12.0% 3.1%
[libx264 @ 0x5d19e10dab40] i16 v,h,dc,p: 14% 62% 13% 10%
[libx264 @ 0x5d19e10dab40] i8 v,h,dc,ddl,ddr,vr,hd,vl,hu: 14% 33% 42%  1%  1%  1%  3%  1%  3%
[libx264 @ 0x5d19e10dab40] i4 v,h,dc,ddl,ddr,vr,hd,vl,hu: 28% 36% 14%  3%  3%  3%  5%  3%  4%
[libx264 @ 0x5d19e10dab40] i8c dc,h,v,p: 47% 37% 13%  2%
[libx264 @ 0x5d19e10dab40] Weighted P-Frames: Y:5.9% UV:0.7%
[libx264 @ 0x5d19e10dab40] ref P L0: 53.3% 13.2% 23.0% 10.2%  0.4%
[libx264 @ 0x5d19e10dab40] ref B L0: 82.6% 14.0%  3.4%
[libx264 @ 0x5d19e10dab40] ref B L1: 91.5%  8.5%
[libx264 @ 0x5d19e10dab40] kb/s:4862.86
```