Results for the different object detection models with OpenVino:

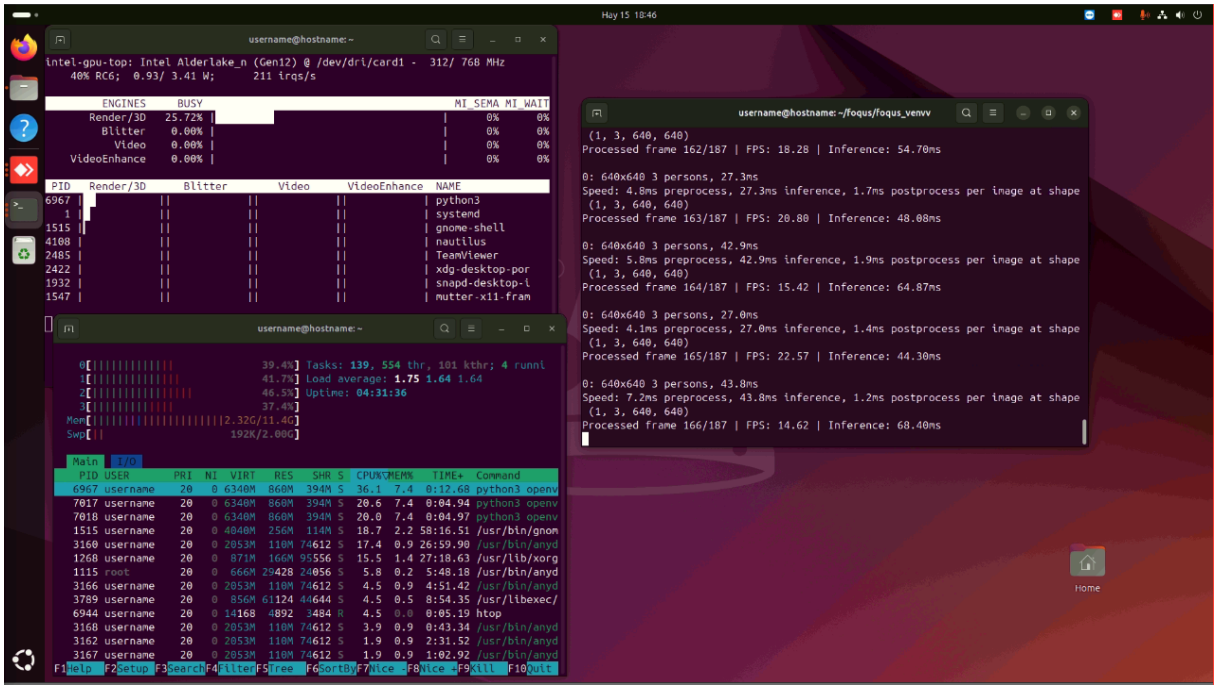
Name	Average FPS	Inference	RAM	CPU	GPU
Yolov11n	19.43	56.29 ms	22.97%	22.44%	40%
Yolov11s	13.04	81.22 ms	24.80%	19.96%	37%
Yolov8n	19.45	56.58 ms	24.45 %	22.41%	28%
Yolov8s	12.13	86.82 ms	24.58%	19.90%	33%
Yolov5nu	19.86	55.53 ms	23.84%	22.43%	25%
Yolov5nu with ONNX	37.18	27.31 ms	24.41%	38.10%	Check video
Yolov8n with ONNX	32.97	30.74	25.78	37.79	Added the video as well
Yolo11n with OONX	33.32	30.52	25.85	40.02	Video as well

Video link for Yolov5nu with ONNX:
https://drive.google.com/file/d/1iL_ywfwc7T-W1vhJ-YPABEit7BEaZz6O/view?usp=sharing

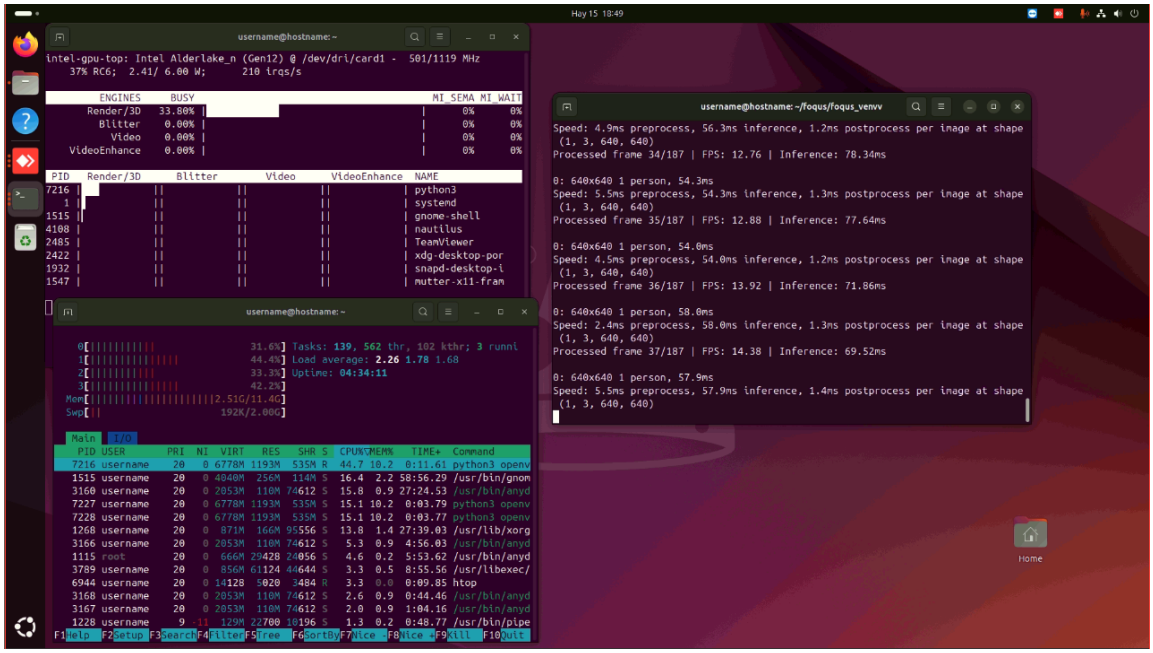
Video link for Yolov8n with ONNX:
https://drive.google.com/file/d/1JT44sL5t1KTIxmckvDy3aAo6tNIQ4klK/view?usp=sharing

Video link for Yolov11n with ONNX:
https://drive.google.com/file/d/1HToL5vplEi4S8POeSXMGcLduZGUqSMBR/view?usp=sharing

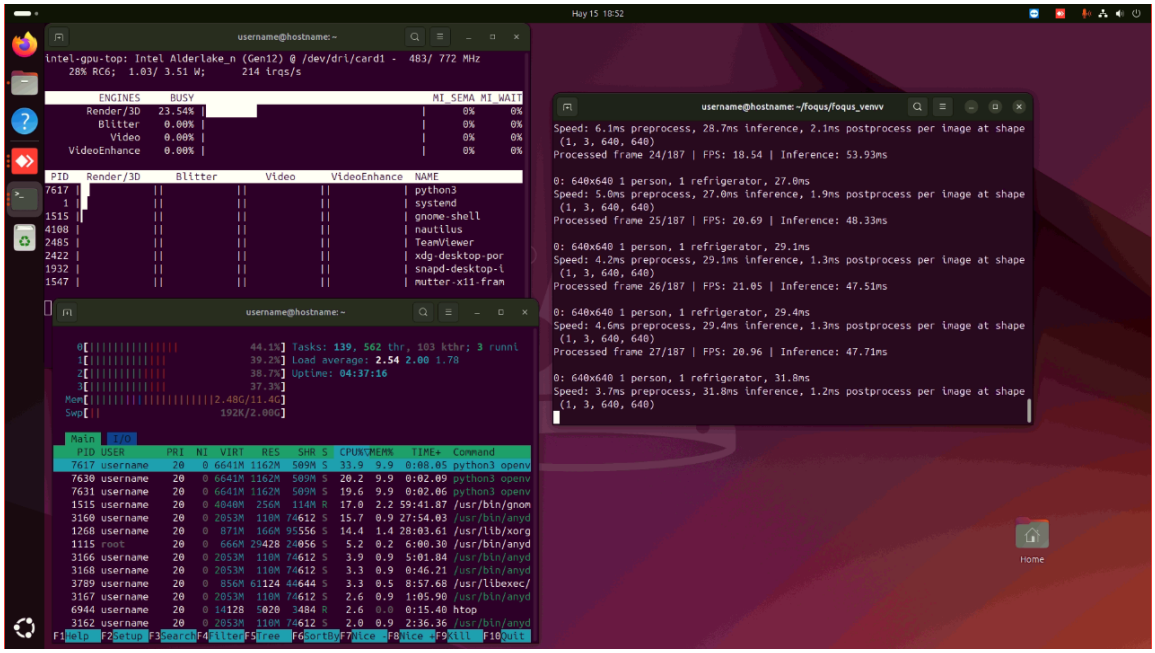
Yolov11n:



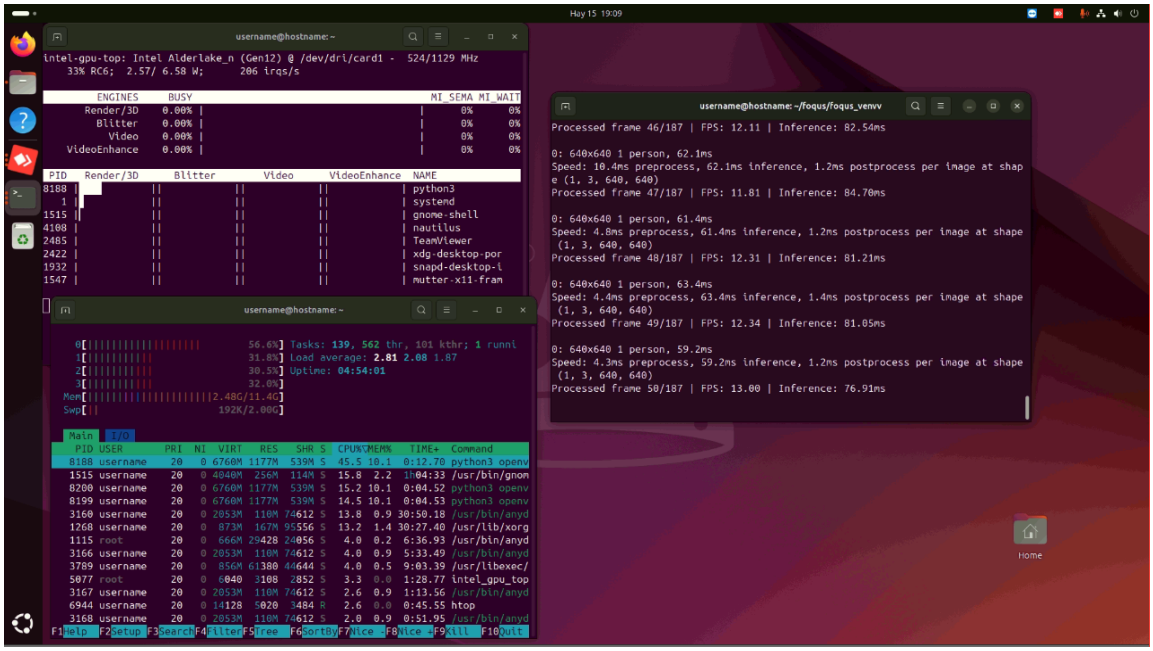
Yolov11s:



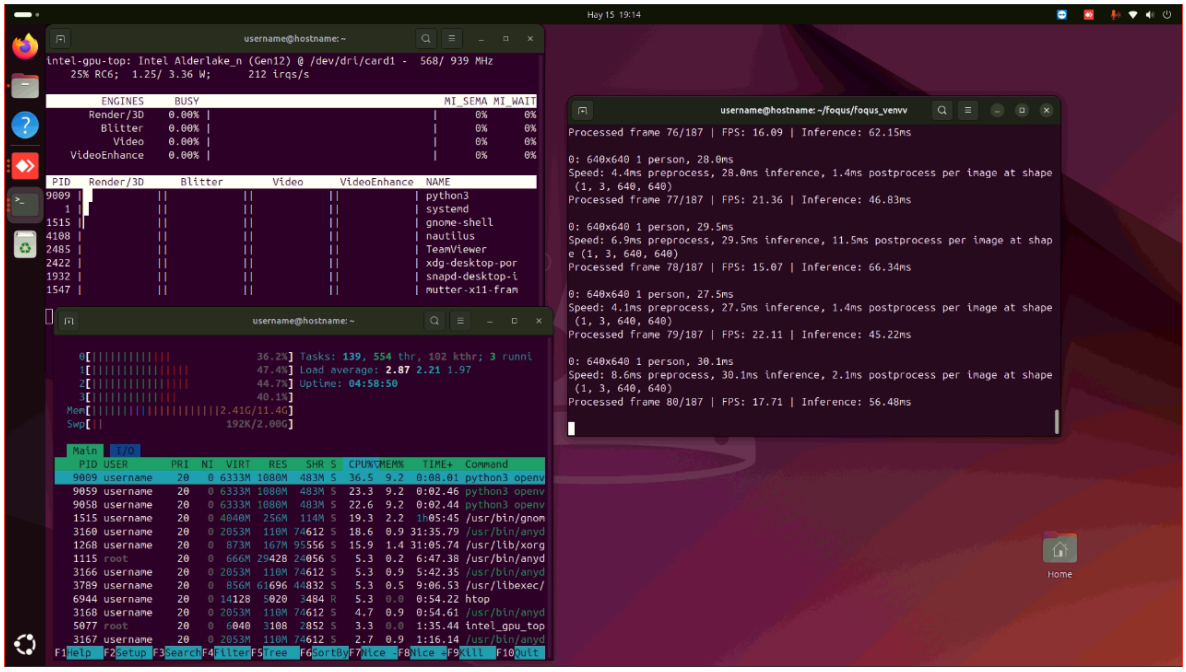
Yolov8n:



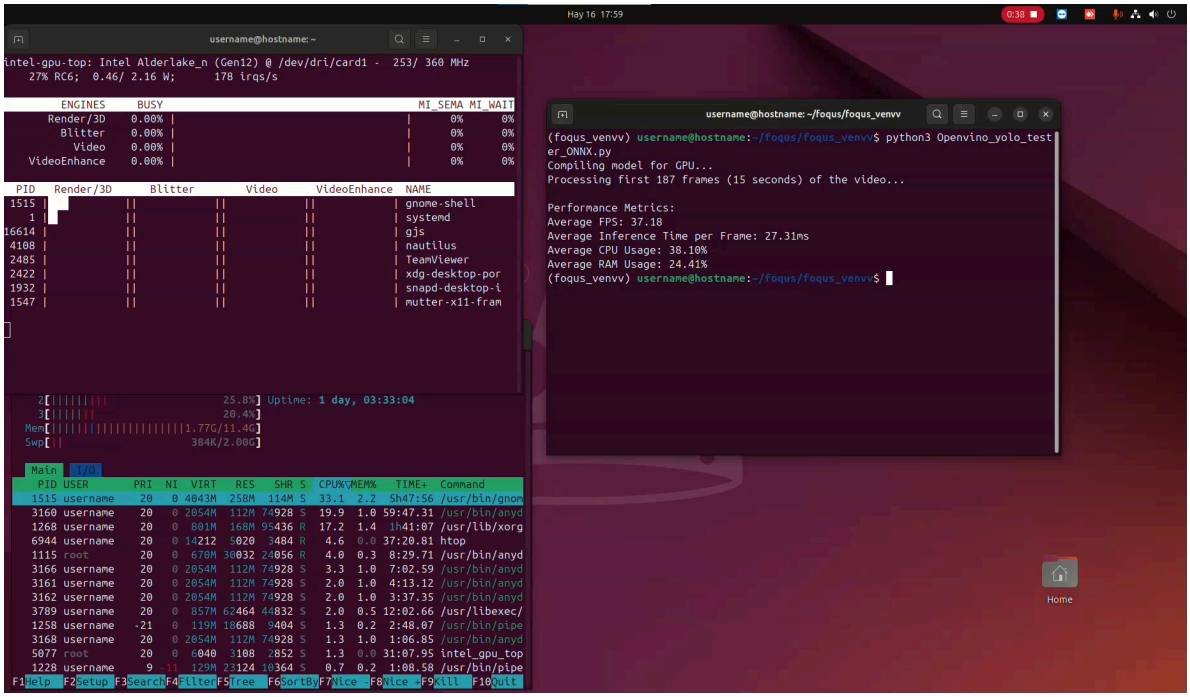
Yolov8s:



Yolov5nu:



YoloV5nu with ONNX format:



The script I used without onnix format:

```
import cv2
import numpy as np
from pathlib import Path
import time
import psutil
import GPUtil
from ultralytics import YOLO
import openvino as ov

# Function to get GPU load
def get_gpu_load():
    gpus = GPUtil.getGPUs()
    if gpus:
        return gpus[0].load * 100  # GPU load as a percentage
    return 0

# Function to get CPU and RAM usage
def get_system_usage():
    cpu_usage = psutil.cpu_percent(interval=0.1)
    ram_usage = psutil.virtual_memory().percent
    return cpu_usage, ram_usage

# Initialize variables for tracking performance
start_time = time.time()
frame_count = 0
total_inference_time = 0
fps_list = []
cpu_usage_list = []
ram_usage_list = []
gpu_load_list = []

# Load the YOLO model
model_name = "yolov5nu"
DET_MODEL_NAME = model_name
det_model = YOLO(f"{DET_MODEL_NAME}.pt")
det_model.to("cpu")

# Convert model to OpenVINO IR if not already converted
```

```
det_model_path =
Path(f"{DET_MODEL_NAME}_openvino_model/{DET_MODEL_NAME}.xml")
if not det_model_path.exists():
    det_model.export(format="openvino", dynamic=True, half=True)

# Load the OpenVINO model
device = "GPU"
core = ov.Core()
det_ov_model = core.read_model(det_model_path)

# Configure OpenVINO model
ov_config = {}
if device != "CPU":
    det_ov_model.reshape({0: [1, 3, 640, 640]})
if "GPU" in device or ("AUTO" in device and "GPU" in
core.available_devices):
    ov_config = {"GPU_DISABLE_WINOGRAD_CONVOLUTION": "YES"}
det_compiled_model = core.compile_model(det_ov_model, device, ov_config)

# Re-instantiate YOLO with OpenVINO
det_model = YOLO(det_model_path.parent, task="detect")
if det_model.predictor is None:
    custom = {"conf": 0.25, "batch": 1, "save": False, "mode": "predict"}
    args = {**det_model.overrides, **custom}
    det_model.predictor =
det_model._smart_load("predictor")(overrides=args,
_callbacks=det_model.callbacks)
    det_model.predictor.setup_model(model=det_model.model)
det_model.predictor.model.ov_compiled_model = det_compiled_model

# Open the video file
video_name = "test.mp4"
cap = cv2.VideoCapture(video_name)
if not cap.isOpened():
    raise Exception(f"Error: Could not open video file {video_name}")

fps = cap.get(cv2.CAP_PROP_FPS)
frame_width = int(cap.get(cv2.CAP_PROP_FRAME_WIDTH))
frame_height = int(cap.get(cv2.CAP_PROP_FRAME_HEIGHT))
```

```
# Process only the first 1 minute of the video
max_frames = int(fps * 15)  # 1 minute of frames
print(f"Processing first {max_frames} frames (1 minute) of the video...")

try:
    while frame_count < max_frames:
        ret, frame = cap.read()
        if not ret:
            break  # Exit if video ends before 1 minute

        # Resize the frame to the model's expected input shape (640x640)
        resized_frame = cv2.resize(frame, (640, 640))

        # Start inference timer
        inference_start_time = time.time()

        # Perform object tracking
        results = det_model.track(resized_frame, show=False)

        # Calculate inference time
        inference_time = time.time() - inference_start_time
        total_inference_time += inference_time

        # Calculate FPS
        current_fps = 1.0 / inference_time
        fps_list.append(current_fps)

        # Get system usage
        cpu_usage, ram_usage = get_system_usage()
        cpu_usage_list.append(cpu_usage)
        ram_usage_list.append(ram_usage)

        # Get GPU load
        gpu_load = get_gpu_load()
        gpu_load_list.append(gpu_load)

        # Increment frame count
        frame_count += 1

        # Print progress
```

```
        print(f"Processed frame {frame_count}/{max_frames} | FPS:
{current_fps:.2f} | Inference: {inference_time * 1000:.2f}ms")

except KeyboardInterrupt:
    print("Process interrupted by user.")

finally:
    # Release the video capture object
    cap.release()

    # Calculate average performance metrics
    if frame_count > 0:
        average_fps = sum(fps_list) / len(fps_list)
        average_inference_time = total_inference_time / frame_count
        average_cpu_usage = sum(cpu_usage_list) / len(cpu_usage_list)
        average_ram_usage = sum(ram_usage_list) / len(ram_usage_list)
        average_gpu_load = sum(gpu_load_list) / len(gpu_load_list)

        # Print the results
        print("\nPerformance Metrics:")
        print(f"Average FPS: {average_fps:.2f}")
        print(f"Average Inference Time per Frame: {average_inference_time
* 1000:.2f}ms")
        print(f"Average CPU Usage: {average_cpu_usage:.2f}%")
        print(f"Average RAM Usage: {average_ram_usage:.2f}%")
        print(f"Average GPU Load: {average_gpu_load:.2f}%")
    else:
        print("No frames processed.")
```

Script for ONNX format:

```
import cv2
import numpy as np
from pathlib import Path
import time
import psutil
import subprocess
from ultralytics import YOLO
import openvino as ov


def get_system_usage():
    cpu_usage = psutil.cpu_percent(interval=0.1)
    ram_usage = psutil.virtual_memory().percent
    return cpu_usage, ram_usage

start_time = time.time()
frame_count = 0
total_inference_time = 0
fps_list = []
cpu_usage_list = []
ram_usage_list = []


model_name = "yolov5nu"  # Change to your desired YOLO model
DET_MODEL_NAME = model_name
det_model = YOLO(f"{DET_MODEL_NAME}.pt")
det_model.to("cpu")


onnx_model_path = Path(f"{DET_MODEL_NAME}.onnx")
if not onnx_model_path.exists():
    print("Exporting YOLO model to ONNX format...")
    det_model.export(format="onnx", dynamic=True, half=True)
device = "GPU"  # Use "CPU" for edge devices without GPU
core = ov.Core()
if device not in core.available_devices:
    print(f"Device {device} is not available. Available devices:
{core.available_devices}")
```

```
    device = "CPU"  # Fallback to CPU
    print(f"Falling back to {device}.")
det_ov_model = core.read_model(onnx_model_path)


ov_config = {}
if device != "CPU":
    det_ov_model.reshape({0: [1, 3, 640, 640]})  # Reshape for GPU
if "GPU" in device or ("AUTO" in device and "GPU" in
core.available_devices):
    ov_config = {"GPU_DISABLE_WINOGRAD_CONVOLUTION": "YES"}  # Optimize
for GPU
print(f"Compiling model for {device}...")
det_compiled_model = core.compile_model(det_ov_model, device, ov_config)
input_layer = det_compiled_model.input(0)
output_layer = det_compiled_model.output(0)

# Open the video file
video_name = "test.mp4"  # Change it to your video file
cap = cv2.VideoCapture(video_name)
if not cap.isOpened():
    raise Exception(f"Error: Could not open video file {video_name}")

fps = cap.get(cv2.CAP_PROP_FPS)
frame_width = int(cap.get(cv2.CAP_PROP_FRAME_WIDTH))
frame_height = int(cap.get(cv2.CAP_PROP_FRAME_HEIGHT))

# Process only the first 15 seconds of the video
max_frames = int(fps * 15)  # Change as needed
print(f"Processing first {max_frames} frames (15 seconds) of the
video...")

try:
    while frame_count < max_frames:
        ret, frame = cap.read()
        if not ret:
            break  # Exit if video ends
        resized_frame = cv2.resize(frame, (640, 640))
        input_data = resized_frame.transpose(2, 0, 1)  # HWC to CHW
```

```
        input_data = np.expand_dims(input_data, axis=0)  # Add batch
dimension
        input_data = input_data.astype(np.float32) / 255.0  # Normalize to
[0, 1]

        inference_start_time = time.time()
        results = det_compiled_model([input_data])[output_layer]
        inference_time = time.time() - inference_start_time
        total_inference_time += inference_time
        current_fps = 1.0 / inference_time
        fps_list.append(current_fps)
        cpu_usage, ram_usage = get_system_usage()
        cpu_usage_list.append(cpu_usage)
        ram_usage_list.append(ram_usage)
        frame_count += 1

        # Print progress or you can comment this out
        print(f"Processed frame {frame_count}/{max_frames} | FPS:
{current_fps:.2f} | "
              f"Inference: {inference_time * 1000:.2f}ms")

except KeyboardInterrupt:
    print("Process interrupted by user.")

finally:
    cap.release()

    # Calculate average performance metrics
    if frame_count > 0:
        average_fps = sum(fps_list) / len(fps_list)
        average_inference_time = total_inference_time / frame_count
        average_cpu_usage = sum(cpu_usage_list) / len(cpu_usage_list)
        average_ram_usage = sum(ram_usage_list) / len(ram_usage_list)

        # Print the results
        print("\nPerformance Metrics:")
        print(f"Average FPS: {average_fps:.2f}")
        print(f"Average Inference Time per Frame: {average_inference_time
* 1000:.2f}ms")
        print(f"Average CPU Usage: {average_cpu_usage:.2f}%")
```

```
        print(f"Average RAM Usage: {average_ram_usage:.2f}%")
    else:
        print("No frames processed.")
```