

```

import zipfile
import os

# Path to uploaded ZIP file
dataset_zip = "/content/shop.v2i.yolov8.zip" # Ensure correct path

# Extract location
extract_path = "/content/dataset"
os.makedirs(extract_path, exist_ok=True)

# Extract dataset
with zipfile.ZipFile(dataset_zip, "r") as zip_ref:
    zip_ref.extractall(extract_path)

print(f"✅ Dataset extracted to: {extract_path}")

```

→ ✅ Dataset extracted to: /content/dataset

```

import os
print(os.listdir(extract_path))

```

→ ['test', 'README.roboflow.txt', 'README.dataset.txt', 'train', 'data.yaml', 'va:

```

import cv2
import os

# Set paths
image_folder = "/content/dataset/train/images" # Update if needed
output_video = "/content/shoplifting_dataset_video.mp4"

# Get sorted list of images
images = sorted([img for img in os.listdir(image_folder) if img.endswith(".jpg")])

if not images:
    print("❌ No images found! Check dataset path.")
else:
    # Read first image to get dimensions
    first_frame = cv2.imread(os.path.join(image_folder, images[0]))
    height, width, _ = first_frame.shape

    # Set up video writer
    fourcc = cv2.VideoWriter_fourcc(*"mp4v")
    video = cv2.VideoWriter(output_video, fourcc, 5, (width, height)) # FPS = 5

    # Add images to video
    for img in images:
        frame = cv2.imread(os.path.join(image_folder, img))
        video.write(frame)

    video.release()
    print(f"✅ Video created: {output_video}")

```

→ ✅ Video created: /content/shoplifting\_dataset\_video.mp4

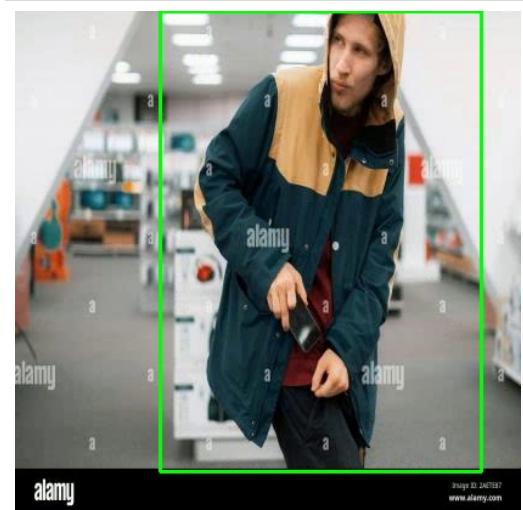
```
!pip install ultralytics opencv-python
```

```

→ Requirement already satisfied: ultralytics in /usr/local/lib/python3.11/dist-packages
Requirement already satisfied: opencv-python in /usr/local/lib/python3.11/dist-packages
Requirement already satisfied: numpy<=2.1.1,>=1.23.0 in /usr/local/lib/python3.11/dist-packages
Requirement already satisfied: matplotlib>=3.3.0 in /usr/local/lib/python3.11/dist-packages
Requirement already satisfied: pillow>=7.1.2 in /usr/local/lib/python3.11/dist-packages
Requirement already satisfied: pyyaml>=5.3.1 in /usr/local/lib/python3.11/dist-packages
Requirement already satisfied: requests>=2.23.0 in /usr/local/lib/python3.11/dist-packages
Requirement already satisfied: scipy>=1.4.1 in /usr/local/lib/python3.11/dist-packages
Requirement already satisfied: torch>=1.8.0 in /usr/local/lib/python3.11/dist-packages
Requirement already satisfied: torchvision>=0.9.0 in /usr/local/lib/python3.11/dist-packages
Requirement already satisfied: tqdm>=4.64.0 in /usr/local/lib/python3.11/dist-packages
Requirement already satisfied: psutil in /usr/local/lib/python3.11/dist-packages
Requirement already satisfied: py-cpuinfo in /usr/local/lib/python3.11/dist-packages
Requirement already satisfied: pandas>=1.1.4 in /usr/local/lib/python3.11/dist-packages
Requirement already satisfied: seaborn>=0.11.0 in /usr/local/lib/python3.11/dist-packages
Requirement already satisfied: ultralytics-thop>=2.0.0 in /usr/local/lib/python3.11/dist-packages
Requirement already satisfied: contourpy>=1.0.1 in /usr/local/lib/python3.11/dist-packages
Requirement already satisfied: cycler>=0.10 in /usr/local/lib/python3.11/dist-packages
Requirement already satisfied: fonttools>=4.22.0 in /usr/local/lib/python3.11/dist-packages
Requirement already satisfied: kiwisolver>=1.3.1 in /usr/local/lib/python3.11/dist-packages

```

frame\_0043.jpg



frame\_0002.jpg X

...

```
Requirement already satisfied: packaging>=20.0 in /usr/local/lib/python3.11/dist-packages/packaging/_structures.py
Requirement already satisfied: pyparsing>=2.3.1 in /usr/local/lib/python3.11/dist-packages/pyparsing/__init__.py
Requirement already satisfied: python-dateutil>=2.7 in /usr/local/lib/python3.11/dist-packages/python_dateutil/_version.py
Requirement already satisfied: pytz>=2020.1 in /usr/local/lib/python3.11/dist-packages/pytz/_localtime.py
Requirement already satisfied: tzdata>=2022.7 in /usr/local/lib/python3.11/dist-packages/tzdata/_data.py
Requirement already satisfied: charset-normalizer<4,>>=2 in /usr/local/lib/python3.11/dist-packages/charset_normalizer/_version.py
Requirement already satisfied: idna<4,>>=2.5 in /usr/local/lib/python3.11/dist-packages/idna/_idn_encoding.py
Requirement already satisfied: urllib3<3,>>=1.21.1 in /usr/local/lib/python3.11/dist-packages/urllib3/_collections.py
Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.11/dist-packages/certifi/_version.py
Requirement already satisfied: filelock in /usr/local/lib/python3.11/dist-packages/filelock/_filelock.py
Requirement already satisfied: typing-extensions>=4.8.0 in /usr/local/lib/python3.11/dist-packages/typing_extensions/_typeshed.py
Requirement already satisfied: networkx in /usr/local/lib/python3.11/dist-packages/networkx/_version.py
Requirement already satisfied: jinja2 in /usr/local/lib/python3.11/dist-packages/jinja2/_version.py
Requirement already satisfied: fsspec in /usr/local/lib/python3.11/dist-packages/fsspec/_version.py
Requirement already satisfied: nvidia-cuda-nvrtc-cu12==12.4.127 in /usr/local/lib/python3.11/dist-packages/nvidia/cuda/nvrtc/_nvrtc.py
Requirement already satisfied: nvidia-cuda-runtime-cu12==12.4.127 in /usr/local/lib/python3.11/dist-packages/nvidia/cuda/runtime/_runtime.py
Requirement already satisfied: nvidia-cuda-cupti-cu12==12.4.127 in /usr/local/lib/python3.11/dist-packages/nvidia/cuda/cupti/_cupti.py
Requirement already satisfied: nvidia-cudnn-cu12==9.1.0.70 in /usr/local/lib/python3.11/dist-packages/nvidia/cudnn/_cudnn.py
Requirement already satisfied: nvidia-cublas-cu12==12.4.5.8 in /usr/local/lib/python3.11/dist-packages/nvidia/cublas/_cublas.py
Requirement already satisfied: nvidia-cufft-cu12==11.2.1.3 in /usr/local/lib/python3.11/dist-packages/nvidia/cufft/_cufft.py
Requirement already satisfied: nvidia-curand-cu12==10.3.5.147 in /usr/local/lib/python3.11/dist-packages/nvidia/curand/_curand.py
Requirement already satisfied: nvidia-cusolver-cu12==11.6.1.9 in /usr/local/lib/python3.11/dist-packages/nvidia/cusolver/_cusolver.py
Requirement already satisfied: nvidia-cusparse-cu12==12.3.1.170 in /usr/local/lib/python3.11/dist-packages/nvidia/cusparse/_cusparse.py
Requirement already satisfied: nvidia-nccl-cu12==2.21.5 in /usr/local/lib/python3.11/dist-packages/nvidia/nccl/_nccl.py
Requirement already satisfied: nvidia-nvtx-cu12==12.4.127 in /usr/local/lib/python3.11/dist-packages/nvidia/nvtx/_nvtx.py
Requirement already satisfied: nvidia-nvjitlink-cu12==12.4.127 in /usr/local/lib/python3.11/dist-packages/nvidia/nvjitlink/_nvjitlink.py
Requirement already satisfied: triton==3.1.0 in /usr/local/lib/python3.11/dist-packages/triton/_triton.py
Requirement already satisfied: sympy==1.13.1 in /usr/local/lib/python3.11/dist-packages/sympy/_version.py
Requirement already satisfied: mpmath<1.4,>=1.1.0 in /usr/local/lib/python3.11/dist-packages/mpmath/_mpmath.py
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.11/dist-packages/six/_six.py
Requirement already satisfied: MarkupSafe==2.0 in /usr/local/lib/python3.11/dist-packages/markupsafe/_compat.py
```

```
pip install yolov5
```

```
Requirement already satisfied: botocore<1.38.0,>=1.37.0 in /usr/local/lib/python3.11/dist-packages/botocore/_version.py
Requirement already satisfied: jmespath<2.0.0,>=0.7.1 in /usr/local/lib/python3.11/dist-packages/jmespath/_version.py
Requirement already satisfied: s3transfer<0.12.0,>=0.11.0 in /usr/local/lib/python3.11/dist-packages/s3transfer/_version.py
Requirement already satisfied: gitdb<5,>=4.0.1 in /usr/local/lib/python3.11/dist-packages/gitdb/_version.py
Requirement already satisfied: filelock in /usr/local/lib/python3.11/dist-packages/filelock/_filelock.py
Requirement already satisfied: fsspec>=2023.5.0 in /usr/local/lib/python3.11/dist-packages/fsspec/_version.py
Requirement already satisfied: packaging>=20.9 in /usr/local/lib/python3.11/dist-packages/packaging/_version.py
Requirement already satisfied: typing-extensions>=3.7.4.3 in /usr/local/lib/python3.11/dist-packages/typing_extensions/_version.py
Requirement already satisfied: contourpy>=1.0.1 in /usr/local/lib/python3.11/dist-packages/contourpy/_version.py
Requirement already satisfied: cyclers>=0.10 in /usr/local/lib/python3.11/dist-packages/cyclers/_version.py
Requirement already satisfied: fonttools>=4.22.0 in /usr/local/lib/python3.11/dist-packages/fonttools/_version.py
Requirement already satisfied: kiwisolver>=1.3.1 in /usr/local/lib/python3.11/dist-packages/kiwisolver/_version.py
Requirement already satisfied: pyparsing>=2.3.1 in /usr/local/lib/python3.11/dist-packages/pyparsing/_version.py
Requirement already satisfied: python-dateutil>=2.7 in /usr/local/lib/python3.11/dist-packages/python_dateutil/_version.py
Requirement already satisfied: pytz>=2020.1 in /usr/local/lib/python3.11/dist-packages/pytz/_version.py
Requirement already satisfied: tzdata>=2022.7 in /usr/local/lib/python3.11/dist-packages/tzdata/_data.py
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Requirement already satisfied: idna<4,>>=2.5 in /usr/local/lib/python3.11/dist-packages/idna/_idn_encoding.py
Requirement already satisfied: urllib3<3,>>=1.21.1 in /usr/local/lib/python3.11/dist-packages/urllib3/_collections.py
Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.11/dist-packages/certifi/_version.py
Requirement already satisfied: opencv-python-headless==4.10.0.84 in /usr/local/lib/python3.11/dist-packages/opencv/_headless.py
Requirement already satisfied: python-dotenv in /usr/local/lib/python3.11/dist-packages/python_dotenv/_version.py
Requirement already satisfied: six in /usr/local/lib/python3.11/dist-packages/six/_six.py
Requirement already satisfied: requests-toolbelt in /usr/local/lib/python3.11/dist-packages/requests_toolbelt/_version.py
Requirement already satisfied: filetype in /usr/local/lib/python3.11/dist-packages/filetype/_version.py
Requirement already satisfied: shapely>=2.0.0 in /usr/local/lib/python3.11/dist-packages/shapely/_version.py
Requirement already satisfied: pybboxes==0.1.6 in /usr/local/lib/python3.11/dist-packages/pybboxes/_version.py
Requirement already satisfied: terminaltables in /usr/local/lib/python3.11/dist-packages/terminaltables/_version.py
Requirement already satisfied: click in /usr/local/lib/python3.11/dist-packages/click/_version.py
```

```
Requirement already satisfied: termcolor in /usr/local/lib/python3.11/dist-p; ▲
Requirement already satisfied: smmap<6,>=3.0.1 in /usr/local/lib/python3.11/|
Requirement already satisfied: MarkupSafe>=2.1.1 in /usr/local/lib/python3.1:
```

```
from ultralytics import YOLO

# Load YOLOv8 model
model = YOLO("yolov8n.pt") # Use YOLOv8 nano

# Train the model
model.train(data="/content/dataset/data.yaml", epochs=100, batch=8, imgsz=640)

print("✅ Training Complete!")
```

Epoch	GPU_mem	box_loss	cls_loss	dfl_loss	Instances	Size	mAP50
29/100	1.12G	1.581	2.098	1.948	9	640	
	Class	Images	Instances	Box(P)	R		
30/100	1.12G	1.589	2.123	2.005	11	640	
	Class	Images	Instances	Box(P)	R		
31/100	1.16G	1.496	1.983	1.846	14	640	
	Class	Images	Instances	Box(P)	R		
32/100	1.12G	1.415	1.938	1.826	9	640	
	Class	Images	Instances	Box(P)	R		
33/100	1.12G	1.397	1.951	1.773	10	640	
	Class	Images	Instances	Box(P)	R		
34/100	1.12G	1.513	1.867	1.835	13	640	
	Class	Images	Instances	Box(P)	R		
35/100	1.15G	1.534	1.964	1.908	4	640	
	Class	Images	Instances	Box(P)	R		
36/100	1.12G	1.399	1.743	1.743	9	640	
	Class	Images	Instances	Box(P)	R		
37/100	1.12G	1.387	1.826	1.724	11	640	
	Class	Images	Instances	Box(P)	R		
38/100	1.11G	1.434	1.774	1.792	6	640	
	Class	Images	Instances	Box(P)	R		
39/100	1.16G	1.375	1.628	1.702	7	640	
	Class	Images	Instances	Box(P)	R		

```
import cv2

# Load trained YOLO model
model = YOLO("/content/runs/detect/train/weights/best.pt")

# Set paths
video_path = "/content/shoplifting_dataset_video.mp4"
output_path = "/content/shoplifting_detection_output.mp4"

# Open video file
```

```
cap = cv2.VideoCapture(video_path)

import cv2

# Load trained YOLO model
model = YOLO("/content/runs/detect/train/weights/best.pt")

# Set paths
video_path = "/content/shoplifting_dataset_video.mp4"
output_path = "/content/shoplifting_detection_output.mp4"

# Open video file
cap = cv2.VideoCapture(video_path)

# Get video properties
fourcc = cv2.VideoWriter_fourcc(*"mp4v")
fps = int(cap.get(cv2.CAP_PROP_FPS))
width = int(cap.get(cv2.CAP_PROP_FRAME_WIDTH))
height = int(cap.get(cv2.CAP_PROP_FRAME_HEIGHT))

# Create VideoWriter
out = cv2.VideoWriter(output_path, fourcc, fps, (width, height))

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

    # Run YOLO detection
    results = model(frame)

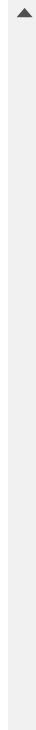
    # Draw bounding boxes
    for r in results:
        for box in r.boxes:
            x1, y1, x2, y2 = map(int, box.xyxy[0])
            label = r.names[int(box.cls)]
            confidence = box.conf[0].item()

            if confidence > 0.5: # Confidence threshold
                cv2.rectangle(frame, (x1, y1), (x2, y2), (0, 255, 0), 2)
                cv2.putText(frame, f"{label} {confidence:.2f}", (x1, y1 - 10),
                           cv2.FONT_HERSHEY_SIMPLEX, 0.5, (0, 255, 0), 2)

    # Write frame to output video
    out.write(frame)

cap.release()
out.release()

print(f"✅ Shoplifting detection complete! Output saved at: {output_path}")
```



0: 640x640 1 shoplifting, 7.4ms  
Speed: 3.5ms preprocess, 7.4ms inference, 1.3ms postprocess per image at sha

0: 640x640 (no detections), 8.3ms  
Speed: 3.3ms preprocess, 8.3ms inference, 0.7ms postprocess per image at sha

0: 640x640 (no detections), 10.3ms  
Speed: 4.4ms preprocess, 10.3ms inference, 0.9ms postprocess per image at sha

0: 640x640 2 shopliftings, 14.4ms  
Speed: 3.4ms preprocess, 14.4ms inference, 1.8ms postprocess per image at sha

0: 640x640 1 shoplifting, 10.3ms  
Speed: 3.6ms preprocess, 10.3ms inference, 1.8ms postprocess per image at sha

0: 640x640 6 shopliftings, 11.5ms  
Speed: 4.6ms preprocess, 11.5ms inference, 1.9ms postprocess per image at sha

0: 640x640 3 shopliftings, 11.9ms  
Speed: 4.4ms preprocess, 11.9ms inference, 1.8ms postprocess per image at sha

0: 640x640 2 shopliftings, 12.2ms  
Speed: 4.5ms preprocess, 12.2ms inference, 1.9ms postprocess per image at sha

Shoplifting detection complete! Output saved at: /content/shoplifting det

Start coding or generate with AI.

```
import locale  
locale.getpreferredencoding = lambda: "UTF-8"
```

```
import os  
print(os.path.exists("/content/runs/detect/train/weights/"))
```

→ True

```
os.system("ls -l /content/runs/detect/train/weights/")
```

0

```
!ls -la "/content/runs/detect/train/weights/"
```

```
→ total 12208
drwxr-xr-x 2 root root    4096 Feb 25 08:04 .
drwxr-xr-x 3 root root    4096 Feb 25 08:04 ..
-rw-r--r-- 1 root root 6244387 Feb 25 08:04 best.pt
-rw-r--r-- 1 root root 6244387 Feb 25 08:04 last.pt
```

```
!find /content/runs/ -name "weights"
```

```
→ /content/runs/detect/train5/weights  
/content/runs/detect/train4/weights  
/content/runs/detect/train6/weights  
/content/runs/detect/train2/weights  
/content/runs/detect/train3/weights  
/content/runs/detect/train/weights  
/content/runs/detect/train7/weights
```

```
import os

labels_path = "/content/dataset/train/labels" # Adjust path if needed
label_files = os.listdir(labels_path)

if label_files:
    print("✅ Labels found:", label_files[:5]) # Show first 5 labels
else:
    print("❌ No label files found! Check your dataset.")
```

```
→ ✓ Labels found: ['teenage-girl-shoplifting-in-department-store-model-re-enactm  
◀ ━━━━ ▶
```

```
model = YOLO("/content/runs/detect/train/weights/best.pt") # Load trained model
video_path = "/content/labeled_video.mp4"
cap = cv2.VideoCapture(video_path)

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

    results = model(frame, conf=0.2) # Reduce confidence threshold
    annotated_frame = results[0].plot()

    cv2.imshow("Shoplifting Detection", annotated_frame)
    if cv2.waitKey(1) & 0xFF == ord("q"):
        break

cap.release()
cv2.destroyAllWindows()
```

```
from ultralytics import YOLO
```

```
model = YOLO("yolov8s.pt") # Load YOLOv8 base model  
model.train(data="/content/dataset/data.yaml", epochs=100, imgsz=640)
```

```
from google.colab.patches import cv2_imshow
```

```
pip install yolov5
```

```
→ Requirement already satisfied: yolov5 in /usr/local/lib/python3.11/dist-packages
Requirement already satisfied: gitpython>=3.1.30 in /usr/local/lib/python3.11/
Requirement already satisfied: matplotlib>=3.3 in /usr/local/lib/python3.11/
Requirement already satisfied: numpy>=1.18.5 in /usr/local/lib/python3.11/di
Requirement already satisfied: opencv-python>=4.1.1 in /usr/local/lib/python3.11/
Requirement already satisfied: Pillow>=7.1.2 in /usr/local/lib/python3.11/di
Requirement already satisfied: psutil in /usr/local/lib/python3.11/dist-pac
Requirement already satisfied: PyYAML>=5.3.1 in /usr/local/lib/python3.11/di
Requirement already satisfied: requests>=2.23.0 in /usr/local/lib/python3.11
Requirement already satisfied: scipy>=1.4.1 in /usr/local/lib/python3.11/di
Requirement already satisfied: thop>=0.1.1 in /usr/local/lib/python3.11/dist
Requirement already satisfied: torch>=1.7.0 in /usr/local/lib/python3.11/di
Requirement already satisfied: torchvision>=0.8.1 in /usr/local/lib/python3.11
Requirement already satisfied: tqdm>=4.64.0 in /usr/local/lib/python3.11/di
Requirement already satisfied: ultralytics>=8.0.100 in /usr/local/lib/python3.11
Requirement already satisfied: tensorboard>=2.4.1 in /usr/local/lib/python3.11
Requirement already satisfied: pandas>=1.1.4 in /usr/local/lib/python3.11/di
Requirement already satisfied: seaborn>=0.11.0 in /usr/local/lib/python3.11/di
Requirement already satisfied: setuptools>=65.5.1 in /usr/local/lib/python3.11
Requirement already satisfied: fire in /usr/local/lib/python3.11/dist-pac
Requirement already satisfied: boto3>=1.19.1 in /usr/local/lib/python3.11/di
Requirement already satisfied: sahi>=0.11.10 in /usr/local/lib/python3.11/di
Requirement already satisfied: huggingface-hub<0.25.0,>=0.12.0 in /usr/local
Requirement already satisfied: tensorflow>=0.2.29 in /usr/local/lib/python3.11
Requirement already satisfied: botocore<1.38.0,>=1.37.0 in /usr/local/lib/py
Requirement already satisfied: jmespath<2.0.0,>=0.7.1 in /usr/local/lib/pyt
Requirement already satisfied: s3transfer<0.12.0,>=0.11.0 in /usr/local/lib/
Requirement already satisfied: gitdb<5,>=4.0.1 in /usr/local/lib/python3.11/
Requirement already satisfied: filelock in /usr/local/lib/python3.11/dist-pa
Requirement already satisfied: fsspec>=2023.5.0 in /usr/local/lib/python3.11
Requirement already satisfied: packaging>=20.9 in /usr/local/lib/python3.11/
Requirement already satisfied: typing-extensions>=3.7.4.3 in /usr/local/lib/
Requirement already satisfied: contourpy>=1.0.1 in /usr/local/lib/python3.11
Requirement already satisfied: cycler>=0.10 in /usr/local/lib/python3.11/di
Requirement already satisfied: fonttools>=4.22.0 in /usr/local/lib/python3.11
Requirement already satisfied: kiwisolver>=1.3.1 in /usr/local/lib/python3.11
Requirement already satisfied: pyparsing>=2.3.1 in /usr/local/lib/python3.11
Requirement already satisfied: python-dateutil>=2.7 in /usr/local/lib/python
Requirement already satisfied: pytz>=2020.1 in /usr/local/lib/python3.11/di
Requirement already satisfied: tzdata>=2022.7 in /usr/local/lib/python3.11/d
Requirement already satisfied: charset-normalizer<4,>=2 in /usr/local/lib/py
Requirement already satisfied: idna<4,>=2.5 in /usr/local/lib/python3.11/di
Requirement already satisfied: urllib3<3,>=1.21.1 in /usr/local/lib/python3.11
Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.11
Requirement already satisfied: opencv-python-headless==4.10.0.84 in /usr/loc
Requirement already satisfied: python-dotenv in /usr/local/lib/python3.11/di
Requirement already satisfied: six in /usr/local/lib/python3.11/dist-package
Requirement already satisfied: requests-toolbelt in /usr/local/lib/python3.11
Requirement already satisfied: filetype in /usr/local/lib/python3.11/dist-pa
Requirement already satisfied: shapely>=2.0.0 in /usr/local/lib/python3.11/d
Requirement already satisfied: pybboxes==0.1.6 in /usr/local/lib/python3.11/d
Requirement already satisfied: terminaltables in /usr/local/lib/python3.11/d
Requirement already satisfied: click in /usr/local/lib/python3.11/dist-pac
Requirement already satisfied: absl-py>=0.4 in /usr/local/lib/python3.11/di
Requirement already satisfied: grpcio>=1.48.2 in /usr/local/lib/python3.11/d
Requirement already satisfied: markdown>=2.6.8 in /usr/local/lib/python3.11/d
Requirement already satisfied: protobuf!=4.24.0,>=3.19.6 in /usr/local/lib/p
```

```
from google.colab.patches import cv2_imshow # Import necessary function
import os
import cv2
from ultralytics import YOLO

# Load trained YOLO model
model = YOLO("/content/runs/detect/train/weights/best.pt") # Update to your model if needed

# Video path
video_path = "/content/shoplifting_dataset_video.mp4" # Update to your video path

# Check if video file exists
if not os.path.exists(video_path):
    print("❌ Video file not found!")
else:
    cap = cv2.VideoCapture(video_path)

    if not cap.isOpened():
        print("❌ Failed to open video!")
    else:
        # Get FPS and frame dimensions
        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))

# Set up VideoWriter to save the output
output_path = "/content/shoplifting_detection_output.mp4"
fourcc = cv2.VideoWriter_fourcc(*'mp4v') # Use mp4v codec
out = cv2.VideoWriter(output_path, fourcc, fps, (frame_width, frame_height))

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

    # Run detection with adjusted confidence threshold and NMS
    results = model(frame, conf=0.5) # Adjust confidence threshold as needed

    # Debug: Check number of detections
    print(f"Detected {len(results[0].boxes)} objects in this frame.")

    # Plot bounding boxes
    for box in results[0].boxes:
        x1, y1, x2, y2 = map(int, box.xyxy[0])
        label = results[0].names[int(box.cls)]
        confidence = box.conf[0].item()

        if confidence > 0.5: # Confidence threshold
            cv2.rectangle(frame, (x1, y1), (x2, y2), (0, 255, 0), 2)
            cv2.putText(frame, f"{label} {confidence:.2f}", (x1, y1 - 10),
                       cv2.FONT_HERSHEY_SIMPLEX, 0.5, (0, 255, 0), 2)

    # Write the annotated frame to output video
    out.write(frame)

    # Display annotated frame using cv2_imshow()
    cv2_imshow(frame)

    # Option to break by pressing 'q'
    if cv2.waitKey(1) & 0xFF == ord("q"):
        break

# Release resources
cap.release()
out.release()
cv2.destroyAllWindows()

print(f"✓ Output video saved at: {output_path}")
```



0: 640x640 3 shopliftings, 9.7ms

Speed: 5.3ms preprocess, 9.7ms inference, 165.7ms postprocess per image at s

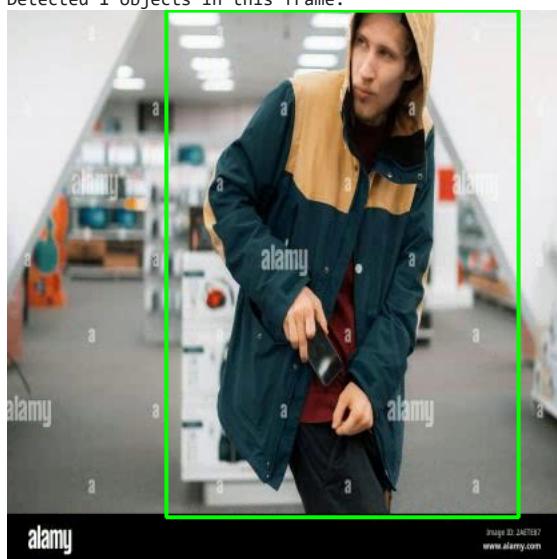
Detected 3 objects in this frame.



0: 640x640 1 shoplifting, 10.2ms

Speed: 5.6ms preprocess, 10.2ms inference, 1.9ms postprocess per image at sha

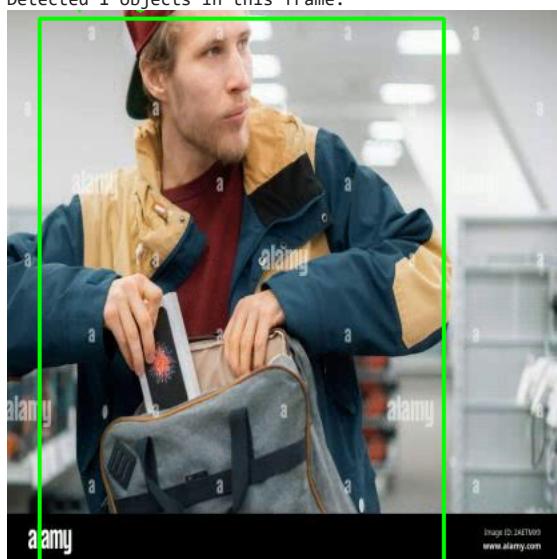
Detected 1 objects in this frame.



0: 640x640 1 shoplifting, 8.8ms

Speed: 4.7ms preprocess, 8.8ms inference, 1.8ms postprocess per image at sha

Detected 1 objects in this frame.



0: 640x640 (no detections), 9.5ms

Speed: 5.4ms preprocess, 9.5ms inference, 0.7ms postprocess per image at sha

Detected 0 objects in this frame.





0: 640x640 1 shoplifting, 9.9ms

Speed: 4.2ms preprocess, 9.9ms inference, 2.0ms postprocess per image at sha  
Detected 1 objects in this frame.



0: 640x640 (no detections), 13.1ms

Speed: 4.0ms preprocess, 13.1ms inference, 0.7ms postprocess per image at sha  
Detected 0 objects in this frame.



0: 640x640 (no detections), 17.4ms

Speed: 4.2ms preprocess, 17.4ms inference, 0.8ms postprocess per image at sha  
Detected 0 objects in this frame.





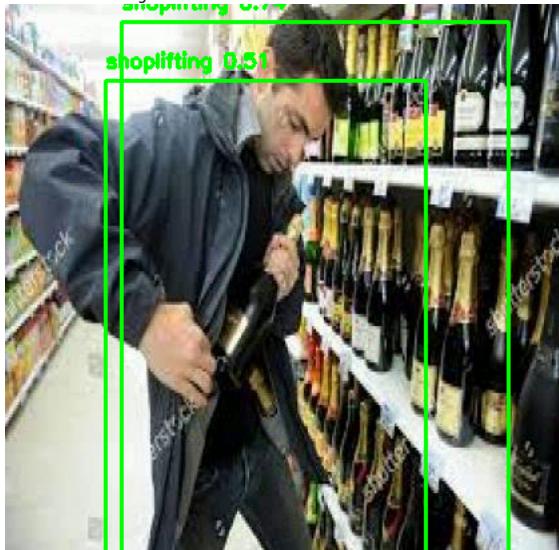
0: 640x640 (no detections), 10.8ms

Speed: 4.5ms preprocess, 10.8ms inference, 1.1ms postprocess per image at sha  
Detected 0 objects in this frame.



0: 640x640 2 shopliftings, 9.3ms

Speed: 4.9ms preprocess, 9.3ms inference, 1.8ms postprocess per image at sha  
Detected 2 objects in this frame.



0: 640x640 (no detections), 9.6ms

Speed: 4.6ms preprocess, 9.6ms inference, 0.7ms postprocess per image at sha  
Detected 0 objects in this frame.





0: 640x640 1 shoplifting, 12.4ms

Speed: 4.7ms preprocess, 12.4ms inference, 1.9ms postprocess per image at sh.

Detected 1 objects in this frame.



0: 640x640 1 shoplifting, 17.6ms

Speed: 4.3ms preprocess, 17.6ms inference, 4.0ms postprocess per image at sh.

Detected 1 objects in this frame.

**shoplifting 0.57**



0: 640x640 1 shoplifting, 10.2ms

Speed: 4.2ms preprocess, 10.2ms inference, 6.8ms postprocess per image at sh.

Detected 1 objects in this frame.



0: 640x640 3 shopliftings, 12.7ms

Speed: 4.0ms preprocess, 12.7ms inference, 1.7ms postprocess per image at sh.  
Detected 3 objects in this frame.



0: 640x640 1 shoplifting, 12.3ms

Speed: 4.1ms preprocess, 12.3ms inference, 1.6ms postprocess per image at sh.  
Detected 1 objects in this frame.



0: 640x640 1 shoplifting, 13.3ms

Speed: 4.1ms preprocess, 13.3ms inference, 4.9ms postprocess per image at sh.  
Detected 1 objects in this frame.



0: 640x640 (no detections), 11.4ms

Speed: 4.3ms preprocess, 11.4ms inference, 0.8ms postprocess per image at sh.  
Detected 0 objects in this frame.



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0: 640x640 (no detections), 9.7ms

Speed: 4.6ms preprocess, 9.7ms inference, 0.7ms postprocess per image at sha  
Detected 0 objects in this frame.



0: 640x640 (no detections), 9.2ms

Speed: 4.4ms preprocess, 9.2ms inference, 0.8ms postprocess per image at sha  
Detected 0 objects in this frame.



0: 640x640 2 shopliftings, 9.1ms

Speed: 4.4ms preprocess, 9.1ms inference, 1.7ms postprocess per image at sha  
Detected 2 objects in this frame.





www.shutterstock.com · 3600U/2032

0: 640x640 (no detections), 12.4ms

Speed: 4.9ms preprocess, 12.4ms inference, 0.9ms postprocess per image at sha

Detected 0 objects in this frame.



Image ID: 216887  
www.alamy.com

0: 640x640 (no detections), 9.2ms

Speed: 4.0ms preprocess, 9.2ms inference, 0.7ms postprocess per image at sha

Detected 0 objects in this frame.



Image ID: 2516197  
www.alamy.com

0: 640x640 (no detections), 12.1ms

Speed: 4.7ms preprocess, 12.1ms inference, 0.8ms postprocess per image at sha

Detected 0 objects in this frame.





0: 640x640 1 shoplifting, 10.0ms

Speed: 4.4ms preprocess, 10.0ms inference, 3.7ms postprocess per image at sha

Detected 1 objects in this frame.

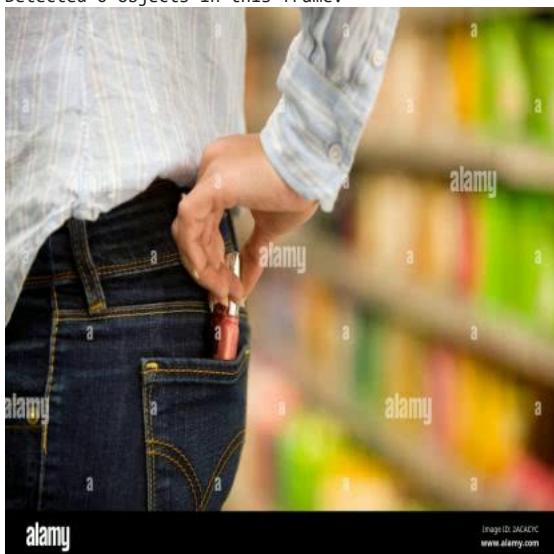
shoplifting 0.57



0: 640x640 (no detections), 9.5ms

Speed: 4.2ms preprocess, 9.5ms inference, 0.7ms postprocess per image at sha

Detected 0 objects in this frame.



0: 640x640 (no detections), 16.5ms

Speed: 5.8ms preprocess, 16.5ms inference, 0.9ms postprocess per image at sha

Detected 0 objects in this frame.





0: 640x640 (no detections), 15.8ms

Speed: 6.2ms preprocess, 15.8ms inference, 1.0ms postprocess per image at sha  
Detected 0 objects in this frame.



0: 640x640 (no detections), 9.6ms

Speed: 5.9ms preprocess, 9.6ms inference, 0.7ms postprocess per image at sha  
Detected 0 objects in this frame.



0: 640x640 (no detections), 9.0ms

Speed: 4.8ms preprocess, 9.0ms inference, 0.7ms postprocess per image at sha  
Detected 0 objects in this frame.



0: 640x640 2 shopliftings, 9.1ms

Speed: 4.7ms preprocess, 9.1ms inference, 1.6ms postprocess per image at sha

Detected 2 objects in this frame.

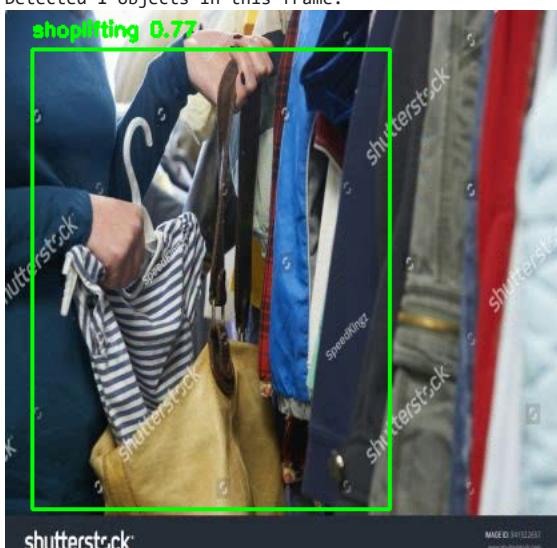


shutterstock

IMAGE ID: 214671001  
www.shutterstock.com

0: 640x640 1 shoplifting, 9.8ms

Speed: 4.0ms preprocess, 9.8ms inference, 1.7ms postprocess per image at sha  
Detected 1 objects in this frame.



shutterstock

IMAGE ID: 14112261  
www.shutterstock.com

0: 640x640 1 shoplifting, 10.0ms

Speed: 4.5ms preprocess, 10.0ms inference, 1.8ms postprocess per image at sha  
Detected 1 objects in this frame.



shutterstock

IMAGE ID: 143971001  
www.shutterstock.com

0: 640x640 2 shopliftings, 11.3ms

Speed: 3.9ms preprocess, 11.3ms inference, 5.7ms postprocess per image at sha  
Detected 2 objects in this frame.





0: 640x640 (no detections), 9.5ms  
Speed: 4.5ms preprocess, 9.5ms inference, 0.8ms postprocess per image at sha  
Detected 0 objects in this frame.



0: 640x640 (no detections), 9.8ms  
Speed: 4.6ms preprocess, 9.8ms inference, 0.7ms postprocess per image at sha  
Detected 0 objects in this frame.



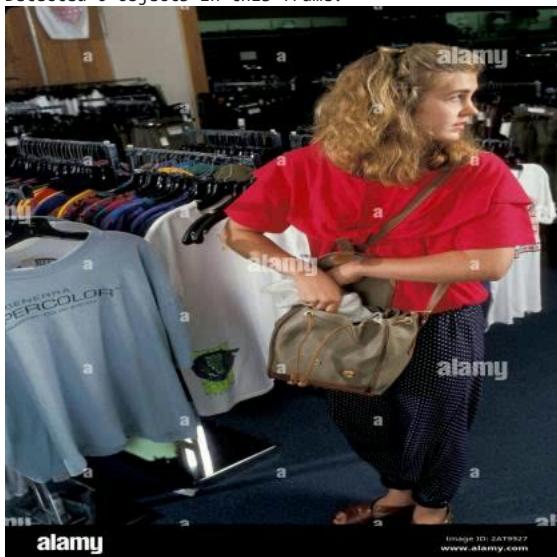
0: 640x640 1 shoplifting, 15.0ms  
Speed: 4.3ms preprocess, 15.0ms inference, 2.1ms postprocess per image at sha  
Detected 1 objects in this frame.





0: 640x640 (no detections), 13.3ms

Speed: 5.1ms preprocess, 13.3ms inference, 0.8ms postprocess per image at sha  
Detected 0 objects in this frame.



0: 640x640 (no detections), 9.5ms

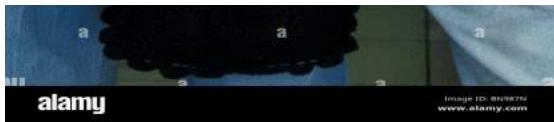
Speed: 4.2ms preprocess, 9.5ms inference, 0.8ms postprocess per image at sha  
Detected 0 objects in this frame.



0: 640x640 (no detections), 9.9ms

Speed: 4.7ms preprocess, 9.9ms inference, 0.7ms postprocess per image at sha  
Detected 0 objects in this frame.





0: 640x640 (no detections), 16.4ms

Speed: 7.6ms preprocess, 16.4ms inference, 1.6ms postprocess per image at sh.

Detected 0 objects in this frame.



0: 640x640 (no detections), 14.9ms

Speed: 8.4ms preprocess, 14.9ms inference, 0.7ms postprocess per image at sh.

Detected 0 objects in this frame.



0: 640x640 3 shopliftings, 11.8ms

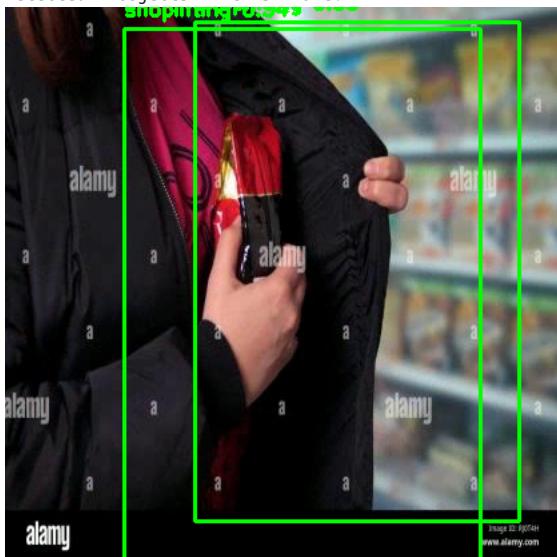
Speed: 4.5ms preprocess, 11.8ms inference, 2.0ms postprocess per image at sh.

Detected 3 objects in this frame.



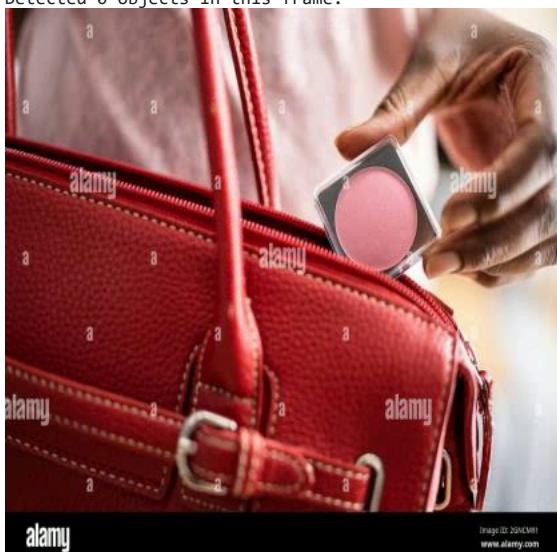
0: 640x640 3 shopliftings, 11.8ms

Speed: 4.3ms preprocess, 9.8ms inference, 1.6ms postprocess per image at sha  
Detected 2 objects in this frame.



0: 640x640 (no detections), 9.9ms

0: 640x640 (no detections), 9.9ms  
Speed: 4.6ms preprocess, 9.9ms inference, 0.9ms postprocess per image at sha  
Detected 0 objects in this frame.



Output video saved at: /content/shoplifting\_detection\_output.mp4

```
from google.colab.patches import cv2_imshow
```

For example, here we download and display a PNG image of the Colab logo:

```
import os
video_path = "/content/shoplifting_dataset_video.mp4" # Replace with your actual path
print(os.path.exists(video_path)) # Should return True if the file exists
```

→ True

```
video_path = "/content/labeled_video.mp4"
print(os.listdir("/content")) # Check if the video file is there
```

→ .ov8 (1).zip', 'shop.v2i.yolov8.zip', 'shoplifting\_dataset\_video.mp4', 'shoplifti

```
model = YOLO("/content/runs/detect/train/weights/best.pt")
# Assuming your video is in /content/
video_path = "/content/shoplifting_dataset_video.mp4" # Change to the actual video
model.predict(source=video_path, conf=0.2, save=True)
```

→

WARNING ⚠ inference results will accumulate in RAM unless `stream=True` is used. This may result in errors for large sources or long-running streams and videos. See <https://docs.ultralytics.com/yolov8/export.html>

Example:

```
results = model(source=..., stream=True) # generator of Results objects
for r in results:
    boxes = r.boxes # Boxes object for bbox outputs
    masks = r.masks # Masks object for segment masks outputs
    probs = r.probs # Class probabilities for classification outputs
```

```
video 1/1 (frame 1/44) /content/shoplifting_dataset_video.mp4: 640x640 6 shopping cart
video 1/1 (frame 2/44) /content/shoplifting_dataset_video.mp4: 640x640 3 shopping cart
video 1/1 (frame 3/44) /content/shoplifting_dataset_video.mp4: 640x640 5 shopping cart
video 1/1 (frame 4/44) /content/shoplifting_dataset_video.mp4: 640x640 2 shopping cart
video 1/1 (frame 5/44) /content/shoplifting_dataset_video.mp4: 640x640 4 shopping cart
video 1/1 (frame 6/44) /content/shoplifting_dataset_video.mp4: 640x640 2 shopping cart
video 1/1 (frame 7/44) /content/shoplifting_dataset_video.mp4: 640x640 (no detections)
video 1/1 (frame 8/44) /content/shoplifting_dataset_video.mp4: 640x640 4 shopping cart
video 1/1 (frame 9/44) /content/shoplifting_dataset_video.mp4: 640x640 5 shopping cart
video 1/1 (frame 10/44) /content/shoplifting_dataset_video.mp4: 640x640 (no detections)
video 1/1 (frame 11/44) /content/shoplifting_dataset_video.mp4: 640x640 5 shopping cart
video 1/1 (frame 12/44) /content/shoplifting_dataset_video.mp4: 640x640 2 shopping cart
video 1/1 (frame 13/44) /content/shoplifting_dataset_video.mp4: 640x640 4 shopping cart
video 1/1 (frame 14/44) /content/shoplifting_dataset_video.mp4: 640x640 5 shopping cart
video 1/1 (frame 15/44) /content/shoplifting_dataset_video.mp4: 640x640 1 shopping cart
video 1/1 (frame 16/44) /content/shoplifting_dataset_video.mp4: 640x640 5 shopping cart
video 1/1 (frame 17/44) /content/shoplifting_dataset_video.mp4: 640x640 4 shopping cart
video 1/1 (frame 18/44) /content/shoplifting_dataset_video.mp4: 640x640 3 shopping cart
video 1/1 (frame 19/44) /content/shoplifting_dataset_video.mp4: 640x640 3 shopping cart
video 1/1 (frame 20/44) /content/shoplifting_dataset_video.mp4: 640x640 4 shopping cart
video 1/1 (frame 21/44) /content/shoplifting_dataset_video.mp4: 640x640 1 shopping cart
video 1/1 (frame 22/44) /content/shoplifting_dataset_video.mp4: 640x640 4 shopping cart
video 1/1 (frame 23/44) /content/shoplifting_dataset_video.mp4: 640x640 5 shopping cart
video 1/1 (frame 24/44) /content/shoplifting_dataset_video.mp4: 640x640 3 shopping cart
video 1/1 (frame 25/44) /content/shoplifting_dataset_video.mp4: 640x640 3 shopping cart
video 1/1 (frame 26/44) /content/shoplifting_dataset_video.mp4: 640x640 2 shopping cart
video 1/1 (frame 27/44) /content/shoplifting_dataset_video.mp4: 640x640 5 shopping cart
video 1/1 (frame 28/44) /content/shoplifting_dataset_video.mp4: 640x640 5 shopping cart
video 1/1 (frame 29/44) /content/shoplifting_dataset_video.mp4: 640x640 1 shopping cart
video 1/1 (frame 30/44) /content/shoplifting_dataset_video.mp4: 640x640 4 shopping cart
video 1/1 (frame 31/44) /content/shoplifting_dataset_video.mp4: 640x640 3 shopping cart
video 1/1 (frame 32/44) /content/shoplifting_dataset_video.mp4: 640x640 3 shopping cart
video 1/1 (frame 33/44) /content/shoplifting_dataset_video.mp4: 640x640 4 shopping cart
video 1/1 (frame 34/44) /content/shoplifting_dataset_video.mp4: 640x640 4 shopping cart
video 1/1 (frame 35/44) /content/shoplifting_dataset_video.mp4: 640x640 (no detections)
video 1/1 (frame 36/44) /content/shoplifting_dataset_video.mp4: 640x640 6 shopping cart
video 1/1 (frame 37/44) /content/shoplifting_dataset_video.mp4: 640x640 1 shopping cart
video 1/1 (frame 38/44) /content/shoplifting_dataset_video.mp4: 640x640 1 shopping cart
video 1/1 (frame 39/44) /content/shoplifting_dataset_video.mp4: 640x640 (no detections)
video 1/1 (frame 40/44) /content/shoplifting_dataset_video.mp4: 640x640 3 shopping cart
video 1/1 (frame 41/44) /content/shoplifting_dataset_video.mp4: 640x640 3 shopping cart
video 1/1 (frame 42/44) /content/shoplifting_dataset_video.mp4: 640x640 6 shopping cart
video 1/1 (frame 43/44) /content/shoplifting_dataset_video.mp4: 640x640 4 shopping cart
video 1/1 (frame 44/44) /content/shoplifting_dataset_video.mp4: 640x640 2 shopping cart
Speed: 3.8ms preprocess, 8.1ms inference, 1.4ms postprocess per image at sha
```

```
import os
import cv2
```

```

from ultralytics import YOLO
import shutil
from sklearn.metrics import precision_score, recall_score, f1_score
import numpy as np

# Define paths
video_path = "/content/shoplifting_dataset_video.mp4" # Path to input video
output_dir = "/content/runs/detect/predict" # Output directory to save frames and \
output_video_path = "/content/shoplifting_detection_output.mp4" # Path to save output video

# Load the trained YOLO model
model = YOLO("/content/runs/detect/train/weights/best.pt")

# Ensure the output directory exists and clear it
if os.path.exists(output_dir):
    shutil.rmtree(output_dir) # Clear previous predictions
os.makedirs(output_dir)

# Run detection on video
results = model.predict(source=video_path, conf=0.2, save=True)

# Initialize variables for accuracy (if ground truth is available)
y_true = [] # Ground truth labels (if available)
y_pred = [] # Predicted labels

# Initialize video writer to create output video
cap = cv2.VideoCapture(video_path)
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))

fourcc = cv2.VideoWriter_fourcc(*"mp4v") # Codec for video format
out_video = cv2.VideoWriter(output_video_path, fourcc, fps, (frame_width, frame_height))

frame_count = 0
while cap.isOpened():
    ret, frame = cap.read()
    if not ret:
        break

    frame_count += 1

    # Fetch the results for the current frame
    current_results = results[frame_count - 1] # Adjust index if needed

    # Annotate frame with bounding boxes
    for result in current_results.boxes:
        x1, y1, x2, y2 = map(int, result.xyxy[0])
        label = current_results.names[int(result.cls)]
        confidence = result.conf[0].item()

        # Optionally, store predicted labels for accuracy
        y_pred.append(label) # Save predicted label

        if confidence > 0.5:
            cv2.rectangle(frame, (x1, y1), (x2, y2), (0, 255, 0), 2)
            cv2.putText(frame, f"{label} {confidence:.2f}", (x1, y1 - 10),
                       cv2.FONT_HERSHEY_SIMPLEX, 0.5, (0, 255, 0), 2)

    # Write the annotated frame to output video
    out_video.write(frame)

    # Save frame as an image
    frame_img_path = os.path.join(output_dir, f"frame_{frame_count:04d}.jpg")
    cv2.imwrite(frame_img_path, frame)

cap.release()
out_video.release()

# Calculate precision, recall, F1-score (if ground truth labels available)
if y_true and y_pred:
    precision = precision_score(y_true, y_pred, average='weighted')
    recall = recall_score(y_true, y_pred, average='weighted')
    f1 = f1_score(y_true, y_pred, average='weighted')

    print(f"Precision: {precision:.4f}")
    print(f"Recall: {recall:.4f}")
    print(f"F1-Score: {f1:.4f}")
else:
    print("No ground truth labels provided. Skipping accuracy calculation.")

# Output paths

```

```
print(f"✓ Detection complete. Images saved to: {output_dir}")
print(f"✓ Output video saved to: {output_video_path}")
```



WARNING ⚠ inference results will accumulate in RAM unless `stream=True` is errors for large sources or long-running streams and videos. See <https://doc>

Example:

```
results = model(source=..., stream=True) # generator of Results objects
for r in results:
    boxes = r.boxes # Boxes object for bbox outputs
    masks = r.masks # Masks object for segment masks outputs
    probs = r.probs # Class probabilities for classification outputs

video 1/1 (frame 1/44) /content/shoplifting_dataset_video.mp4: 640x640 6 sho
video 1/1 (frame 2/44) /content/shoplifting_dataset_video.mp4: 640x640 3 sho
video 1/1 (frame 3/44) /content/shoplifting_dataset_video.mp4: 640x640 5 sho
video 1/1 (frame 4/44) /content/shoplifting_dataset_video.mp4: 640x640 2 sho
```