TOPICS IN COMPUTER SCIENCE-II

ASSIGNMENT

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REGISTRATION NUMBER:

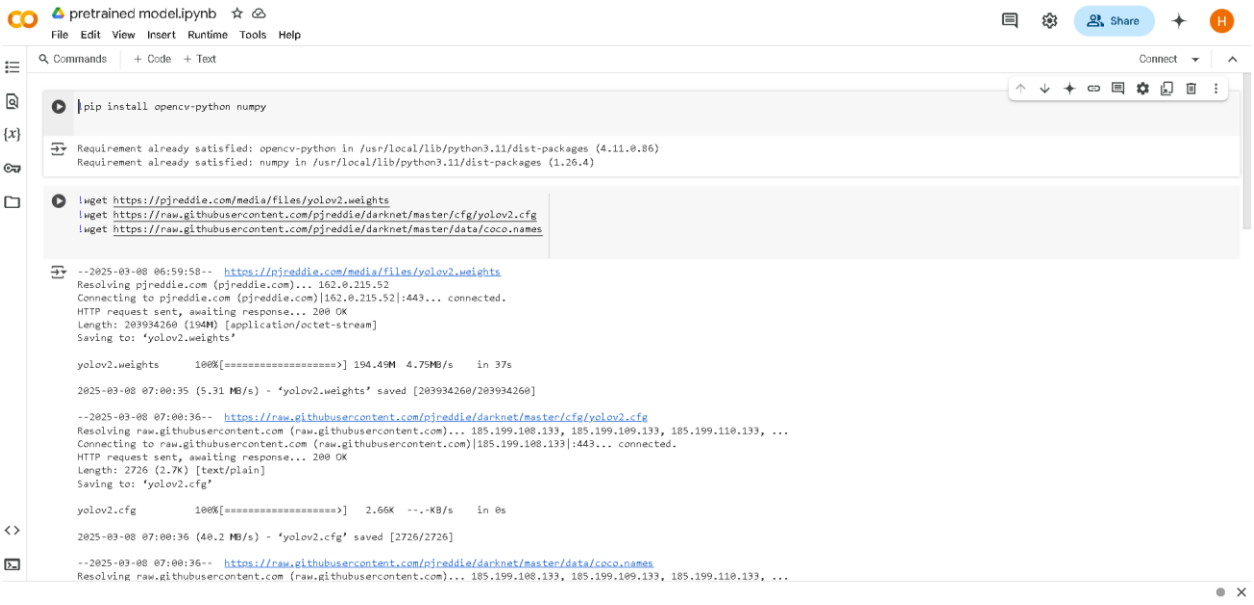
FA21-BCS-066

SECTION:

BCS-8A

QUESTION NO.1:

SCREENSHOTS:



```python
import cv2
import numpy as np

# Load YOLO model
net = cv2.dnn.readNet("yolov2.weights", "yolov2.cfg")

# Load class labels
with open("coco.names", "r") as f:
    classes = [line.strip() for line in f.readlines()]

layer_names = net.getLayerNames()
output_layers = [layer_names[i - 1] for i in net.getUnconnectedOutLayers()]
```

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

# Upload an image
from google.colab import files
uploaded = files.upload()

image_path = list(uploaded.keys())[0]
img = cv2.imread(C:\Users\mr laptop\Pictures\th.jfif)
height, width, _ = img.shape

# Preprocess image for YOLO
blob = cv2.dnn.blobFromImage(img, 0.00392, (416, 416), swapRB=True, crop=False)
net.setInput(blob)
detections = net.forward(output_layers)

# Draw bounding boxes
for output in detections:
    for detection in output:
```

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

# Upload an image
from google.colab import files
uploaded = files.upload()

image_path = list(uploaded.keys())[0]
img = cv2.imread(C:\Users\mr laptop\Pictures\th.jfif)
height, width, _ = img.shape

# Preprocess image for YOLO
blob = cv2.dnn.blobFromImage(img, 0.00392, (416, 416), swapRB=True, crop=False)
net.setInput(blob)
detections = net.forward(output_layers)

# Draw bounding boxes
for output in detections:
    for detection in output:
        scores = detection[5:]
        class_id = np.argmax(scores)
        confidence = scores[class_id]
        if confidence > 0.5:
            print(f"Detected: {classes[class_id]} with confidence {confidence}")

cv2_imshow(img)
```

Show hidden output

```
Start coding or generate with AI.
```

QUESTION NO.2

SCREENSHOTS:

```
[ ] from IPython.display import clear_output
    !pip install ultralytics ultralytics-hub
    !pip install roboflow
    !pip install torch torchvision torchaudio --index-url https://download.pytorch.org/whl/cu118
    !pip install opencv-python
    clear_output()
```

```
from roboflow import Roboflow
rf = Roboflow(api_key="l3q1fED75K0y0Mgl97cS")
project = rf.workspace("tics-d9zsl").project("rock-paper-scissors-sxsw-yzhqg")
version = project.version(1)
dataset = version.download("yolov11")
```

```
loading Roboflow workspace...
loading Roboflow project...
Downloading Dataset Version Zip in rock-paper-scissors-1 to yolov11:: 100%|| 335627/335627 [00:11<00:00, 29359.25it/s]

Extracting Dataset Version Zip to rock-paper-scissors-1 in yolov11:: 100%|| 12051/12051 [00:02<00:00, 5546.42it/s]
```

```
[ ] from ultralytics import YOLO

    # Option 2: Load a pretrained model (recommended)
    model = YOLO("yolo11s.pt")  # Ensure "yolo11n.pt" exists in your working directory
```

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Commands + Code + Text Reconnect T4

```
[ ] Creating new Ultralytics Settings v0.0.6 file
    View Ultralytics Settings with 'yolo settings' or at '/root/.config/Ultralytics/settings.json'
    Update Settings with 'yolo settings key=value', i.e. 'yolo settings runs_dir=path/to/dir'. For help see https://docs.ultralytics.com/quickstart/#ultralytics-se
    Downloading https://github.com/ultralytics/assets/releases/download/v8.3.0/yolo11s.pt to 'yolo11s.pt'...
    100%| 18.4M/18.4M [00:00<00:00, 278MB/s]
```

```
# Load an image (replace with your image path)
image_path = '/content/rock-paper-scissors-1/test/images/10e0gvm_jpg.rf.699998b8530ef51665cc107a437488a9.jpg'

# Run inference
results = model(image_path)

# Display results
results[0].show()  # Access the first element in the list and call .show()
```

```
image 1/1 /content/rock-paper-scissors-1/test/images/10e0gvm_jpg.rf.699998b8530ef51665cc107a437488a9.jpg: 640x512 (no detections), 16.6ms
Speed: 4.1ms preprocess, 16.6ms inference, 1.2ms postprocess per image at shape (1, 3, 640, 512)
```

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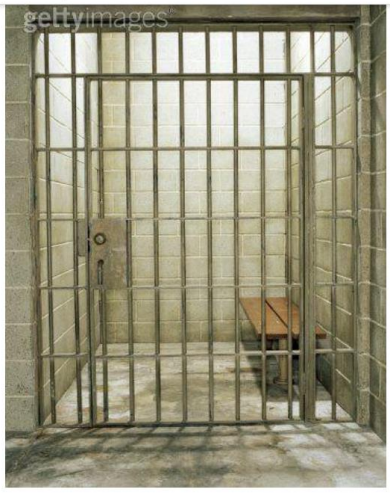


```
[ ] from ultralytics import YOLO
```

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Reconnect T4

```
Classes: tensor([], device='cuda:0')
Confidences: tensor([], device='cuda:0')
```

```
from ultralytics import YOLO

# Load the pretrained model
model = YOLO("yolo11n.pt")  # Replace with the path to your pretrained model

# Fine-tune the model on your custom dataset
results = model.train(
    data="/content/rock-paper-scissors-1/data.yaml",  # Path to your dataset configuration file
    epochs=100,                 # Number of training epochs
    imgsz=640,                  # Image size
    batch=16,                   # Batch size
    device=0,                   # Use GPU (set device=0 for GPU, device='cpu' for CPU)
    workers=2,                  # Number of data loading workers
    lr0=0.01,                   # Initial learning rate
    weight_decay=0.0005,        # Weight decay
    optimizer="SGD",            # Optimizer (SGD, Adam, etc.)
    name="yolo11n_finetuned"    # Name of the training run
)

# Validate the model on the validation set
metrics = model.val()  # Validate the model
print(metrics.box.map)  # Print mAP (mean Average Precision)
```

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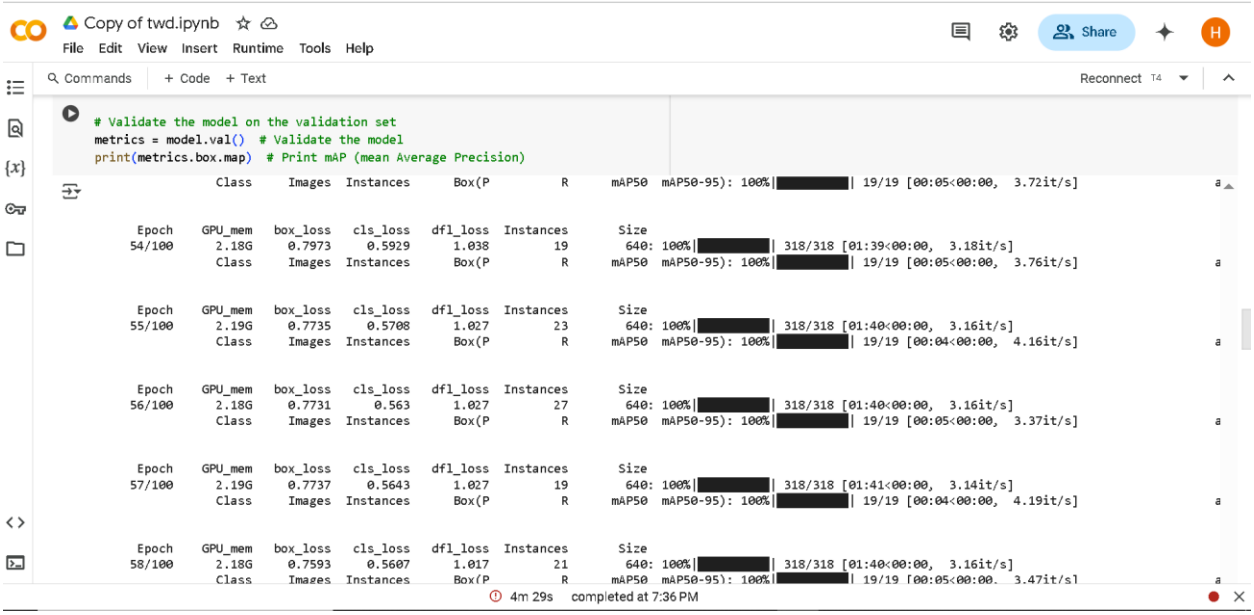
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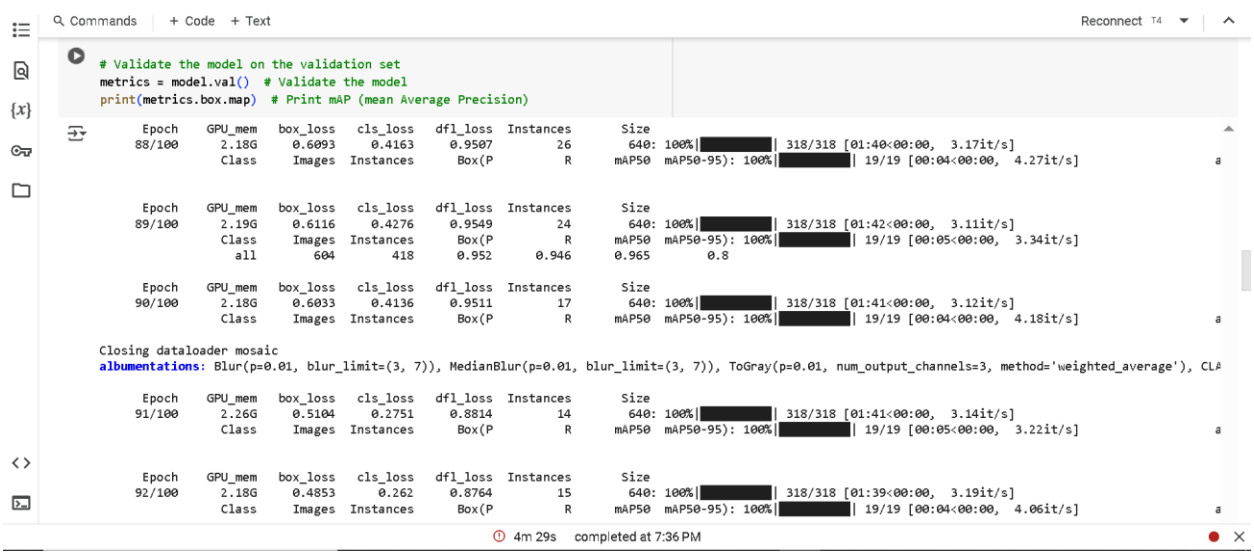
Commands + Code + Text
Reconnect T4
# Validate the model on the validation set
metrics = model.val() # Validate the model
print(metrics.box.map) # Print mAP (mean Average Precision)
Class Images Instances Box(P R mAP50 mAP50-95): 100%| 19/19 [00:05<00:00, 3.72it/s]
Epoch GPU_mem box_loss cls_loss dfl_loss Instances Size
54/100 2.18G 0.7973 0.5929 1.038 19 640: 100%| 318/318 [01:39<00:00, 3.18it/s]
Class Images Instances Box(P R mAP50 mAP50-95): 100%| 19/19 [00:05<00:00, 3.76it/s]
Epoch GPU_mem box_loss cls_loss dfl_loss Instances Size
55/100 2.19G 0.7735 0.5708 1.027 23 640: 100%| 318/318 [01:40<00:00, 3.16it/s]
Class Images Instances Box(P R mAP50 mAP50-95): 100%| 19/19 [00:04<00:00, 4.16it/s]
Epoch GPU_mem box_loss cls_loss dfl_loss Instances Size
56/100 2.18G 0.7731 0.563 1.027 27 640: 100%| 318/318 [01:40<00:00, 3.16it/s]
Class Images Instances Box(P R mAP50 mAP50-95): 100%| 19/19 [00:05<00:00, 3.37it/s]
Epoch GPU_mem box_loss cls_loss dfl_loss Instances Size
57/100 2.19G 0.7737 0.5643 1.027 19 640: 100%| 318/318 [01:41<00:00, 3.14it/s]
Class Images Instances Box(P R mAP50 mAP50-95): 100%| 19/19 [00:04<00:00, 4.19it/s]
Epoch GPU_mem box_loss cls_loss dfl_loss Instances Size
58/100 2.18G 0.7593 0.5607 1.017 21 640: 100%| 318/318 [01:40<00:00, 3.16it/s]
4m 29s completed at 7:36 PM


Commands + Code + Text
Reconnect T4
# Validate the model on the validation set
metrics = model.val() # Validate the model
print(metrics.box.map) # Print mAP (mean Average Precision)
Epoch GPU_mem box_loss cls_loss dfl_loss Instances Size
88/100 2.18G 0.6093 0.4163 0.9507 26 640: 100%| 318/318 [01:40<00:00, 3.17it/s]
Class Images Instances Box(P R mAP50 mAP50-95): 100%| 19/19 [00:04<00:00, 4.27it/s]
Epoch GPU_mem box_loss cls_loss dfl_loss Instances Size
89/100 2.19G 0.6116 0.4276 0.9549 24 640: 100%| 318/318 [01:42<00:00, 3.11it/s]
Class Images Instances Box(P R mAP50 mAP50-95): 100%| 19/19 [00:05<00:00, 3.34it/s]
all 604 418 0.952 0.946 0.965 0.8
Epoch GPU_mem box_loss cls_loss dfl_loss Instances Size
90/100 2.18G 0.6033 0.4136 0.9511 17 640: 100%| 318/318 [01:41<00:00, 3.12it/s]
Class Images Instances Box(P R mAP50 mAP50-95): 100%| 19/19 [00:04<00:00, 4.18it/s]
Closing dataloader mosaic
albumentations: Blur(p=0.01, blur_limit=(3, 7)), MedianBlur(p=0.01, blur_limit=(3, 7)), ToGray(p=0.01, num_output_channels=3, method='weighted_average'), CL
Epoch GPU_mem box_loss cls_loss dfl_loss Instances Size
91/100 2.26G 0.5104 0.2751 0.8814 14 640: 100%| 318/318 [01:41<00:00, 3.14it/s]
Class Images Instances Box(P R mAP50 mAP50-95): 100%| 19/19 [00:05<00:00, 3.22it/s]
Epoch GPU_mem box_loss cls_loss dfl_loss Instances Size
92/100 2.18G 0.4853 0.262 0.8764 15 640: 100%| 318/318 [01:39<00:00, 3.19it/s]
Class Images Instances Box(P R mAP50 mAP50-95): 100%| 19/19 [00:04<00:00, 4.06it/s]
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Reconnect T4

```
[ ] # Test on an image
    results = model("/content/rock-paper-scissors-1/test/images/19171_298_298_1_0_jpg.rf.4d8ae761c7c79f9e26b0814e2479deba.jpg")
    results[0].show()  # Display the results
```

```
image 1/1 /content/rock-paper-scissors-1/test/images/19171_298_298_1_0_jpg.rf.4d8ae761c7c79f9e26b0814e2479deba.jpg: 640x640 (no detections), 10.6ms
Speed: 3.5ms preprocess, 10.6ms inference, 0.9ms postprocess per image at shape (1, 3, 640, 640)
```

```
[ ] from google.colab import files
    files.download("/content/runs/detect/yolo11n_finetuned/weights/best.pt")
```

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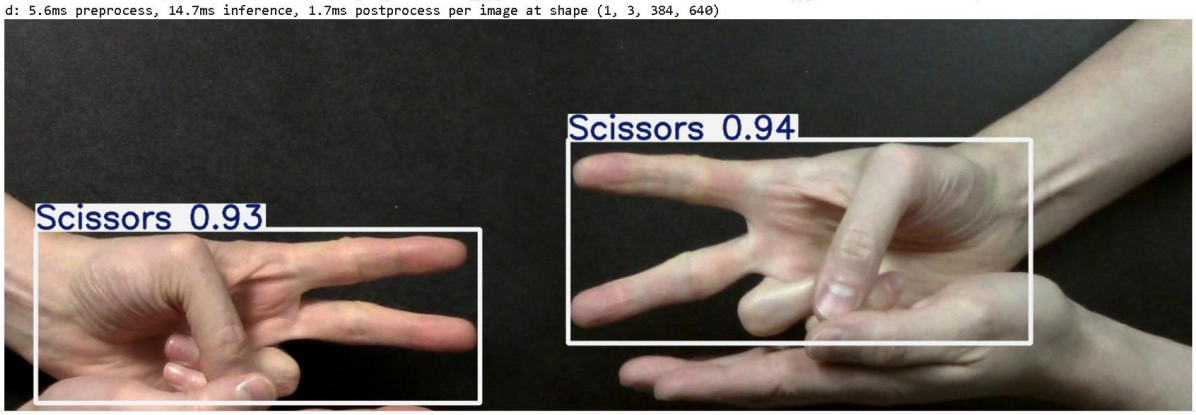
Reconnect T4

```
[ ] from google.colab import files
    files.download("/content/runs/detect/yolo11n_finetuned/weights/best.pt")
```

```
[ ] import os
    import time
    from ultralytics import YOLO

    # Load the fine-tuned model
    model = YOLO("/content/runs/detect/yolo11n_finetuned/weights/best.pt")  # Replace with your fine-tuned model path

    # Directory containing test images
    test_images_dir = "/content/rock-paper-scissors-1/test/images"

    # Iterate through all images in the directory
    for image_name in os.listdir(test_images_dir):
        # Construct the full path to the image
        image_path = os.path.join(test_images_dir, image_name)

        # Run inference on the image
        results = model(image_path)

        # Display the results
        results[0].show()  # Show the image with detections

        # Add a delay (e.g., 5 seconds)
```

```
e 1/1 /content/rock-paper-scissors-1/test/images/youtube-124_jpg.rf.4c30b9060dcbac3f0fe3ab77f0329a71.jpg: 384x640 2 Scissorss, 14.7ms
d: 5.6ms preprocess, 14.7ms inference, 1.7ms postprocess per image at shape (1, 3, 384, 640)
```



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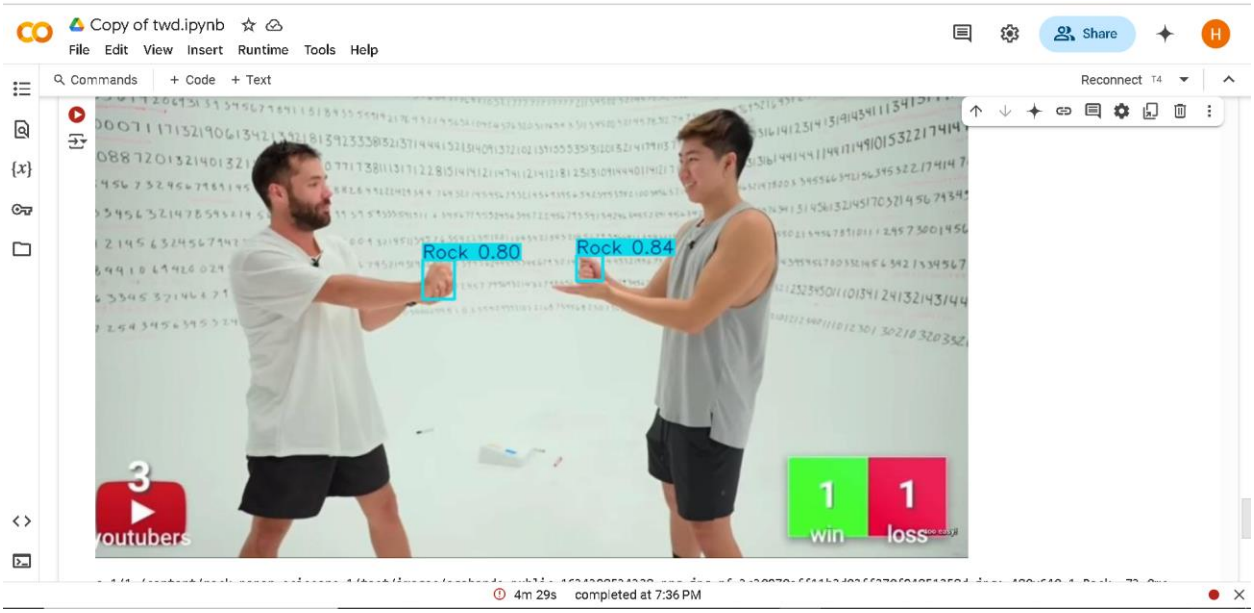
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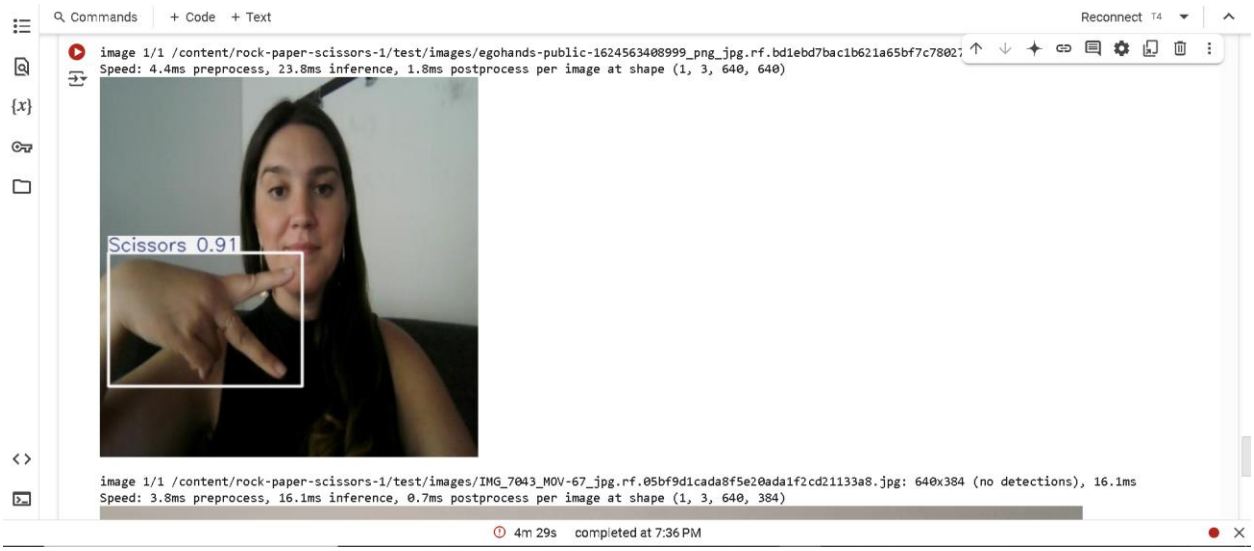
Reconnect T4
Rock 0.80
Rock 0.84
3
1
win
1
loss
4m 29s completed at 7:36 PM


Commands
+ Code
+ Text
Reconnect T4
image 1/1 /content/rock-paper-scissors-1/test/images/egohands-public-1624563408999_png_jpg.rf.bd1ebd7bac1b621a65bf7c7802
Speed: 4.4ms preprocess, 23.8ms inference, 1.8ms postprocess per image at shape (1, 3, 640, 640)
Scissors 0.91
image 1/1 /content/rock-paper-scissors-1/test/images/IMG_7043_MOV-67_jpg.rf.05bf9d1cada8f5e20ada1f2cd21133a8.jpg: 640x384 (no detections), 16.1ms
Speed: 3.8ms preprocess, 16.1ms inference, 0.7ms postprocess per image at shape (1, 3, 640, 384)
4m 29s completed at 7:36 PM