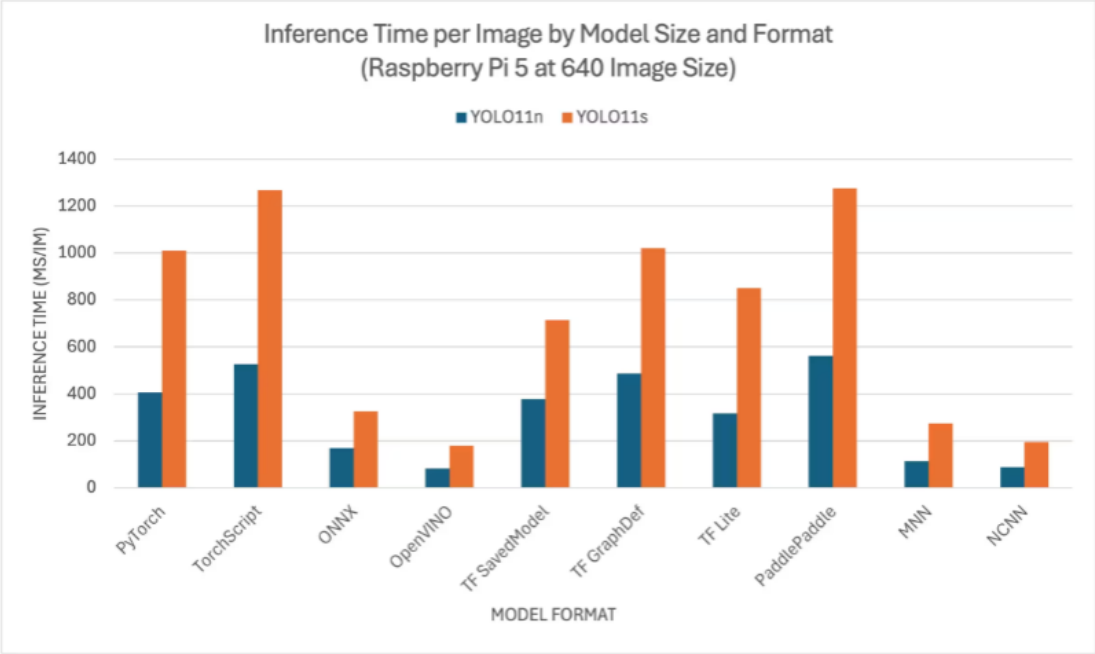
Model Conversion

Note: Using the Docker container in the factory image does not require re-setting up the environment. The environment is already set up. Simply enter Docker and run the corresponding function commands according to the previous tutorial.

1. Raspberry Pi 5 YOLO11 (Benchmark)

YOLO11 benchmark data comes from the Ultralytics team, and is tested on models in various formats (data for reference only).

Officially, only YOLO11n and YOLO11s models were benchmarked. Other models are too large to run on Raspberry Pis and may not provide good performance.



2. Model Conversion

**Conversion cannot be performed on the Jetson Nano board in Docker because the PyTorch/Ultralytics dependencies are too new and the CPU/GPU instruction sets are incompatible. You can first export to TensorRT/ONNX on a Raspberry Pi or PC, then run it on the Jetson Nano:

Based on the test parameters for different model formats provided by the Ultralytics team, we found that using TensorRT for inference performance is the best!

```
The first time you use the export mode for YOLO11, some dependencies will
automatically be installed. Wait for it to complete!
```

2.1. CLI: pt → onnx, pt → ncnn

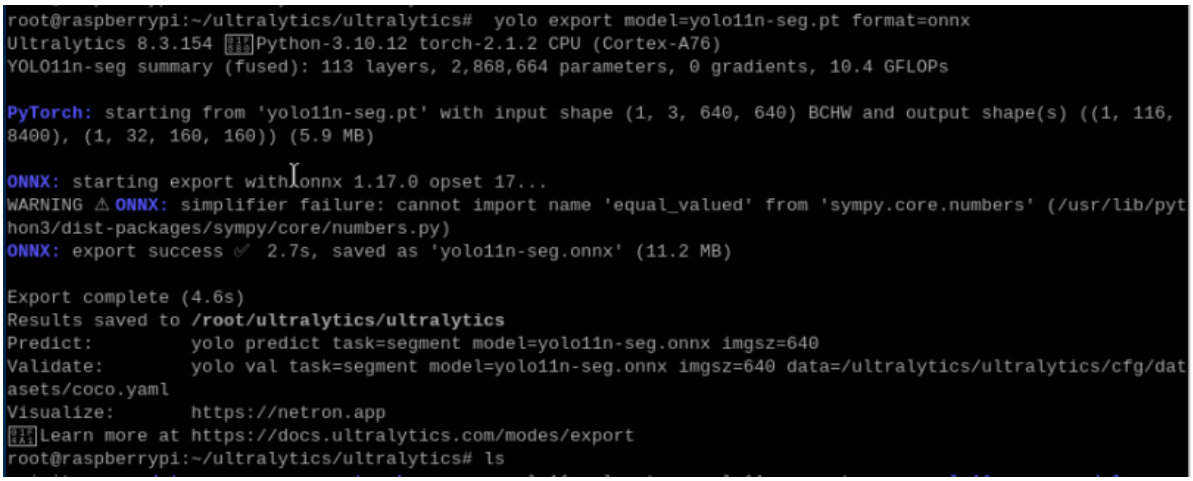
Convert the PyTorch model to onnx and ncnn

```
cd ~/ultralytics/ultralytics/
```

Run the following command in the terminal:

```
yolo export model=yolo11n.pt format=onnx
# yolo export model=yolo11n-seg.pt format=onnx
# yolo export model=yolo11n-pose.pt format=onnx
# yolo export model=yolo11n-cls.pt format=onnx
# yolo export model=yolo11n-obb.pt format=onnx

yolo export model=yolo11n.pt format=ncnn
# yolo export model=yolo11n-seg.pt format=ncnn
# yolo export model=yolo11n-pose.pt format=ncnn
# yolo export model=yolo11n-cls.pt format=ncnn
# yolo export model=yolo11n-obb.pt format=ncnn
```

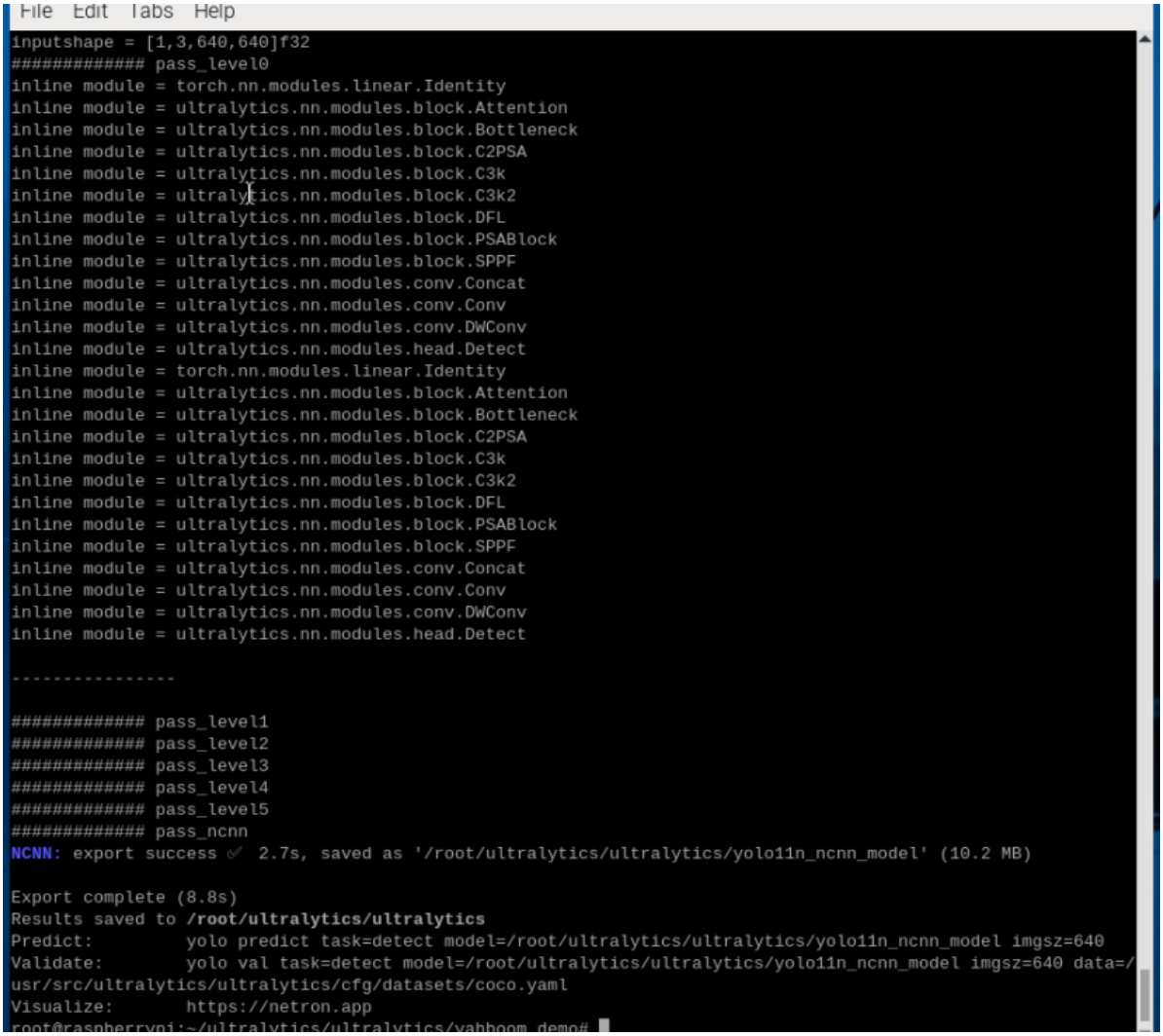


2.2. Python: pt → onnx → ncnn

Converting a PyTorch model to TensorRT: The conversion process automatically generates an ONNX model.

```
cd ~/ultralytics/ultralytics/yahboom_demo
```

```
python3 model_pt_onnx_ncnn.py
```



Sample code:

```
from ultralytics import YOLO

# Load a YOLO11n PyTorch model
model = YOLO("/root/ultralytics/ultralytics/yolo11n.pt")
# model = YOLO("/root/ultralytics/ultralytics/yolo11n-seg.pt")
# model = YOLO("/root/ultralytics/ultralytics/yolo11n-pose.pt")
# model = YOLO("/root/ultralytics/ultralytics/yolo11n-cls.pt")
# model = YOLO("/root/ultralytics/ultralytics/yolo11n-obb.pt")

# Export the model to ONNX format
model.export(format="onnx") # This will create 'yolo11n.onnx' in the same
directory

# Export the model to NCNN format
model.export(format="ncnn") # Creates 'yolo11n_ncnn_model'
```

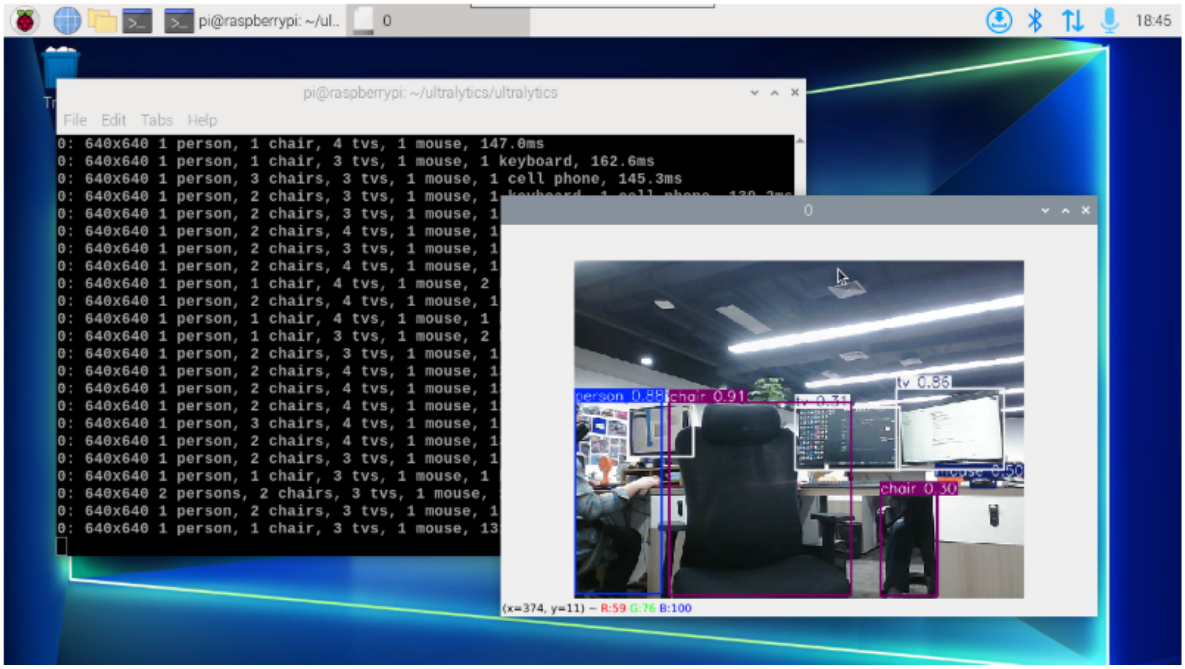
3. Model Prediction

CLI Usage

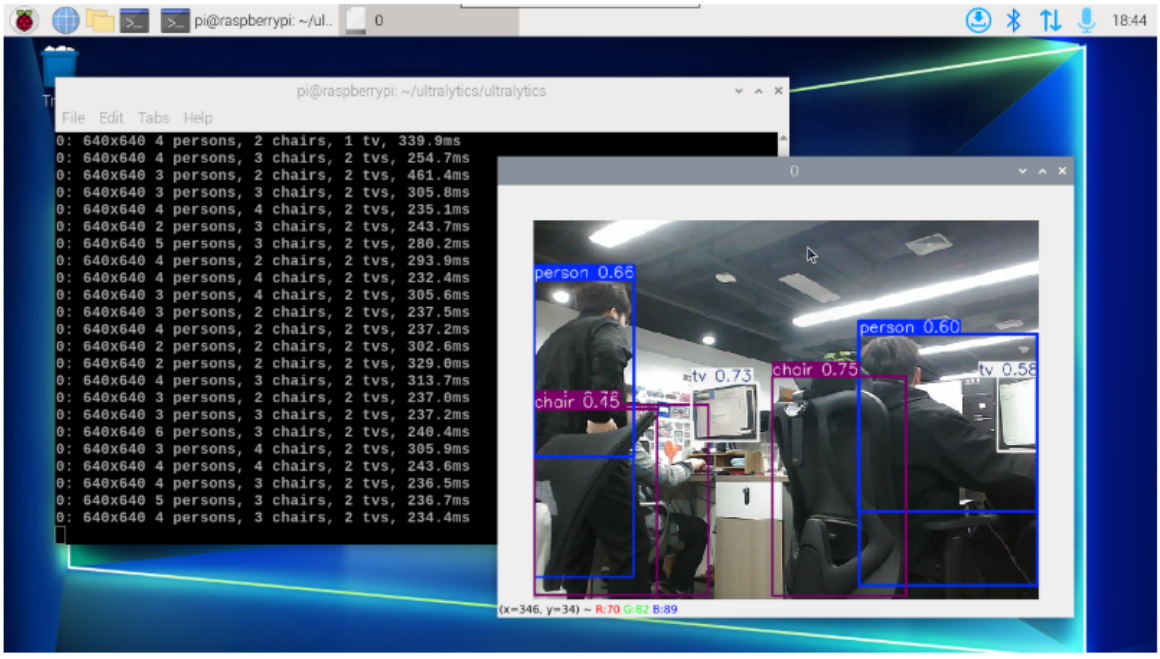
Currently, the CLI only supports USB camera calls!

```
cd ~/ultralytics/ultralytics/
```

```
yolo predict model=yolo11n.onnx source=0 save=False show
```




```
yolo predict model=yolo11n_ncnn_model source=0 save=False show
```



References

https://docs.ultralytics.com/guides/nvidia-pi/

https://docs.ultralytics.com/integrations/tensorrt/