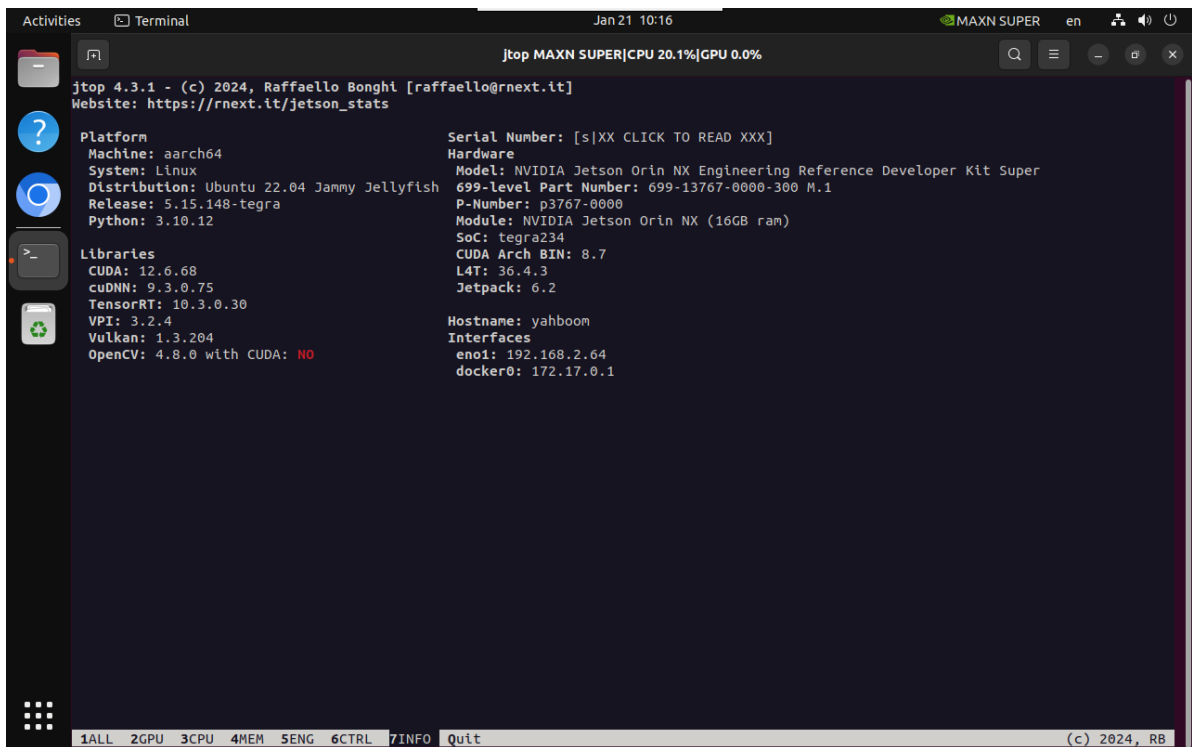


# YOLO environment construction

## YOLO environment construction

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## 1. System Information



```
Activities  Terminal  Jan 21 10:16  MAXN SUPER  en  [Icons]  [Power]

jtop MAXN SUPER|CPU 20.1%|GPU 0.0%

jtop 4.3.1 - (c) 2024, Raffaello Bonghi [raffaello@rnext.it]
Website: https://rnext.it/jetson_stats

Platform
Machine: aarch64
System: Linux
Distribution: Ubuntu 22.04 Jammy Jellyfish
Release: 5.15.148-tegra
Python: 3.10.12

Serial Number: [s|XX CLICK TO READ XXX]

Hardware
Model: NVIDIA Jetson Orin NX Engineering Reference Developer Kit Super
699-Level Part Number: 699-13767-0000-300 M.1
P-Number: p3767-0000
Module: NVIDIA Jetson Orin NX (16GB ram)
SoC: tegra234
CUDA Arch BIN: 8.7
L4T: 36.4.3
Jetpack: 6.2

Libraries
CUDA: 12.6.68
cuDNN: 9.3.0.75
TensorRT: 10.3.0.30
VPI: 3.2.4
Vulkan: 1.3.204
OpenCV: 4.8.0 with CUDA: NO

Hostname: yahboom
Interfaces
eno1: 192.168.2.64
docker0: 172.17.0.1

1ALL 2GPU 3CPU 4MEM 5ENG 6CTRL 7INFO Quit (c) 2024, RB
```

## 2. Preliminary preparation

```
sudo apt update
sudo apt install python3-pip -y
sudo pip install -u pip
```

## 3. Install Ultralytics

```
sudo pip3 install ultralytics[export]
```

```
sudo reboot
```

## 4. Configure GPU acceleration

Since we have already installed torch 2.5.0 and torchvision 0.20 in the previous tutorial, there is no need to run the torch and torchvision installation commands here, only the other software packages need to be installed.

### torch

```
sudo pip3 install
https://github.com/ultralytics/assets/releases/download/v0.0.0/torch-
2.5.0a0+872d972e41.nv24.08-cp310-cp310-linux_aarch64.whl
```

### torchvision

```
sudo pip3 install
https://github.com/ultralytics/assets/releases/download/v0.0.0/torchvision-
0.20.0a0+afc54f7-cp310-cp310-linux_aarch64.whl
```

### cuSPARSElt

```
wget
https://developer.download.nvidia.com/compute/cuda/repos/ubuntu2204/arm64/cuda-
keyring_1.1-1_all.deb
sudo dpkg -i cuda-keyring_1.1-1_all.deb
sudo apt-get update
sudo apt-get -y install libcusparselt0 libcusparselt-dev
```

### onnxruntime-gpu

```
sudo pip3 install
https://github.com/ultralytics/assets/releases/download/v0.0.0/onnxruntime_gpu-
1.20.0-cp310-cp310-linux_aarch64.whl
```

Note: Using onnxruntime-gpu requires installing a specific version of numpy. If it is not 1.23.5, you can run the following command to install the specified version

```
sudo pip3 install numpy==1.23.5
```

## 4. Verify the installation

### Validating Ultralytics

```
python3 -c "import ultralytics; print(ultralytics.__version__)"
```

### Verifying Torch

```
python3 -c "import torch; print(torch.__version__);
print(torch.cuda.is_available())"
```

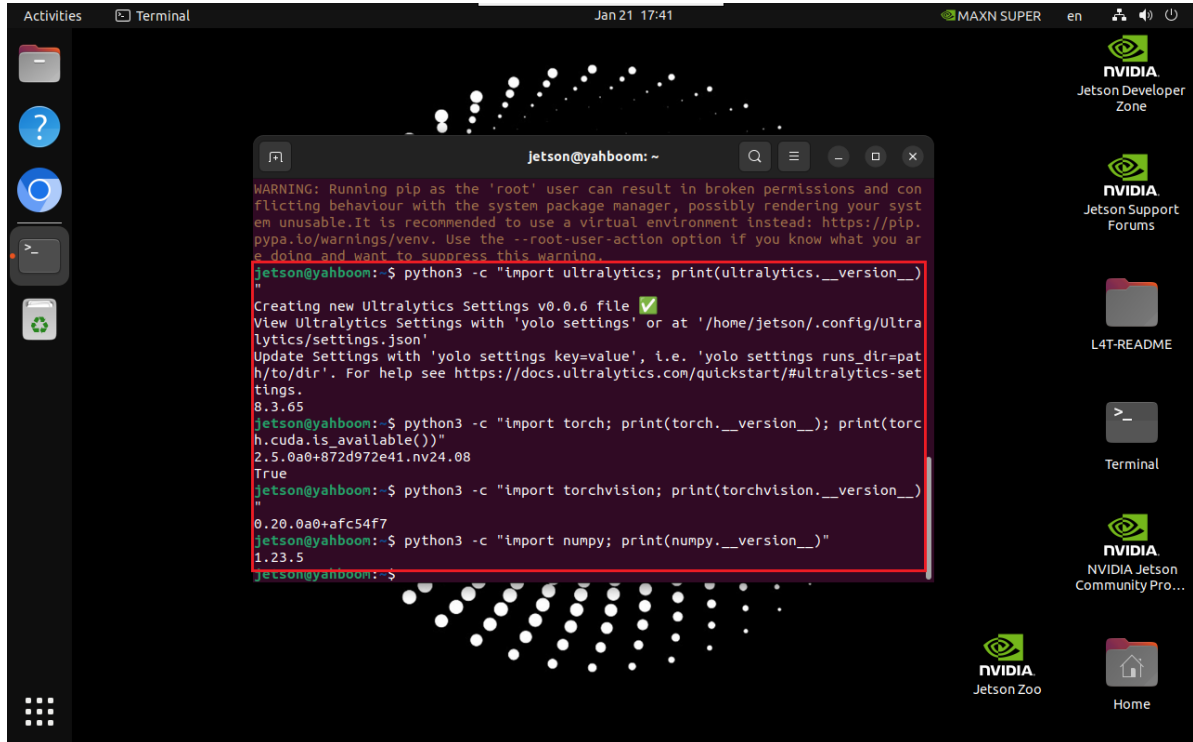
### Verifying Torchvision

```
python3 -c "import torchvision; print(torchvision.__version__)"
```

## Verify Numpy

```
python3 -c "import numpy; print(numpy.__version__)"
```

**Note:** The ultralytics version will be updated later, please refer to the version information queried in the system



## Common errors

### Cannot uninstall sympy

#### Error phenomenon

Cannot uninstall sympy

```
jetson@yahboom: ~  
Downloading cachetools-5.5.0-py3-none-any.whl (9.5 kB)  
Downloading dm-tree-0.1.8-cp310-cp310-manylinux_2_17_aarch64.manylinux2014_aarch64.whl (146 kB)  
Downloading pyasn1-modules-0.4.1-py3-none-any.whl (181 kB)  
Downloading requests_oauthlib-2.0.0-py2.py3-none-any.whl (24 kB)  
Downloading rsa-4.9-py3-none-any.whl (34 kB)  
Downloading toolz-1.0.0-py3-none-any.whl (56 kB)  
Downloading etils-1.11.0-py3-none-any.whl (165 kB)  
Downloading pyasn1-0.6.1-py3-none-any.whl (83 kB)  
Building wheels for collected packages: coremltools, tensorflow-decision-forests  
  Building wheel for coremltools (setup.py) ... done  
  Created wheel for coremltools: filename=coremltools-8.1-py3-none-any.whl size=1906276 sha256=f5f2bc7a692bc977d2786446270cbd16269e  
ba8ee8499e4a75eff912c96b161  
  Stored in directory: /root/.cache/pip/wheels/a8/e7/34/c56aa3436de9e0f169ee6f76558f022029f0e2029431f03ab1  
  Building wheel for tensorflow-decision-forests (setup.py) ... done  
  Created wheel for tensorflow-decision-forests: filename=tensorflow_decision_forests-1.8.1-cp310-cp310-linux_aarch64.whl size=15337  
184 sha256=79bd2276339542db5db60d6f1e9f53f7af22bcf85624c8d0ad47f394a9c6fce6  
  Stored in directory: /root/.cache/pip/wheels/91/95/9b/1aa6efffb85dab1e4f179c17c55f279c28e200ec8788a8a94d  
Successfully built coremltools tensorflow-decision-forests  
Installing collected packages: py-cpuinfo, opencv-telemetry, mpmath, dm-tree, wurlitizer, wrapt, tqdm, toolz, threadpoolctl, tensor  
flow-estimator, sympy, seaborn, scipy, pyasn1, pyaml, packaging, opencv-python, onnx, networkx, msgpack, keras, joblib, importlib_re  
sources, humanize, fsspec, filelock, etils, catrs, cachetools, torch, tensorstore, scikit-learn, rsa, requests-oauthlib, pyasn1-mod  
ules, opencv, jaxlib, coremltools, ultralytics-thop, torchvision, jax, google-auth, ultralytics, orbax-checkpoint, google-auth-oau  
thlib, chex, tensorboard, optax, tensorflow-cpu-aws, flax, tensorflow, tf-keras, tensorflow-decision-forests, tensorflow-hub, tensor  
flows  
  Attempting uninstall: mpmath  
    Found existing installation: mpmath 0.0.0  
    Uninstalling mpmath-0.0.0:  
      Successfully uninstalled mpmath-0.0.0  
  Attempting uninstall: wrapt  
    Found existing installation: wrapt 1.17.0  
    Uninstalling wrapt-1.17.0:  
      Successfully uninstalled wrapt-1.17.0  
  Attempting uninstall: sympy  
    Found existing installation: sympy 1.9  
error: uninstall-distutils-installed-package  
  
x Cannot uninstall sympy 1.9  
  ↳ It is a distutils installed project and thus we cannot accurately determine which files belong to it which would lead to only a  
partial uninstall.  
jetson@yahboom: $
```

## Solution

Uninstall python3-sympy: Reinstall PyTorch after uninstallation

```
sudo apt remove python3-sympy -y
```

## CSI camera cannot be called

Compile OpenCV from source code and enable GStreamer support: basically the entire process is automatically installed. It is recommended to uninstall the old version and install the new version (the script automatically enables CUDA and GStreamer functions)

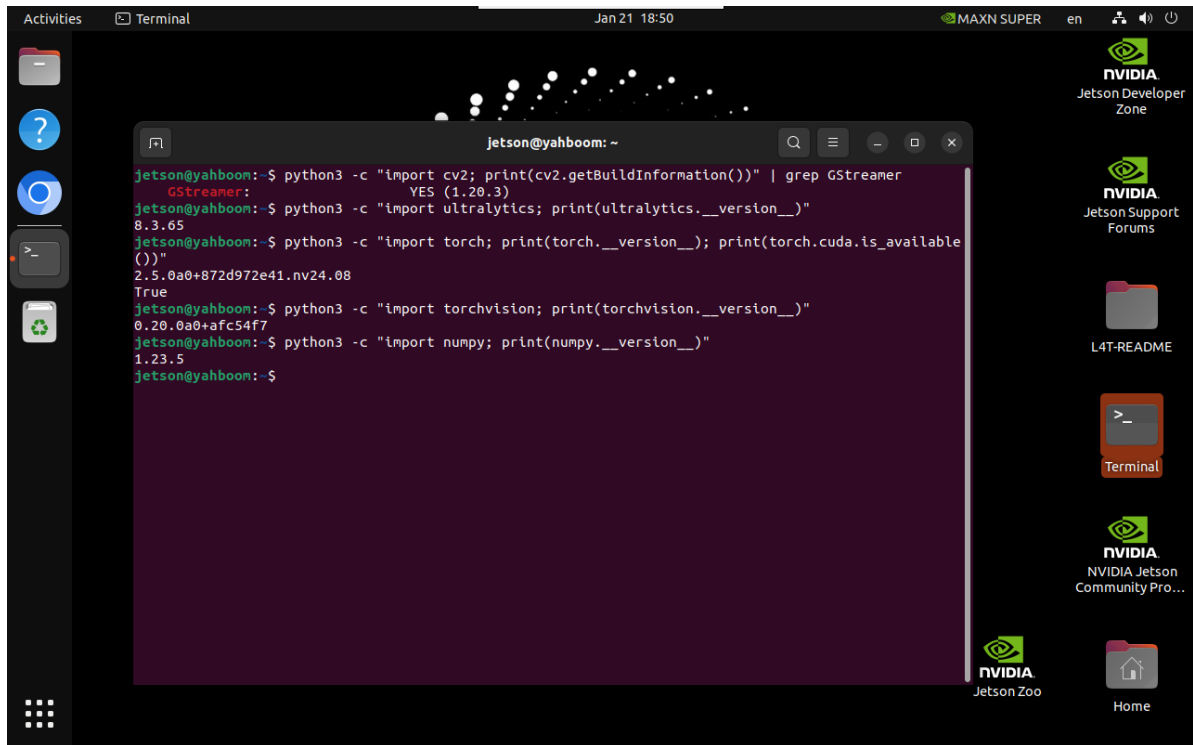
```
git clone https://github.com/AastaNV/JEP.git  
cd JEP/script  
bash install_opencv4.10.0_Jetpack6.1.sh
```

```
Jetson@yahboom: ~/JEP/script
jetson@yahboom:~$ git clone https://github.com/AastaNV/JEP.git
Cloning into 'JEP'...
remote: Enumerating objects: 209, done.
remote: Counting objects: 100% (24/24), done.
remote: Compressing objects: 100% (14/14), done.
remote: Total 209 (delta 14), reused 18 (delta 10), pack-reused 185 (from 1)
Receiving objects: 100% (209/209), 233.56 MiB | 10.24 MiB/s, done.
Resolving deltas: 100% (105/105), done.
jetson@yahboom:~$ cd JEP/script
jetson@yahboom:~/JEP/script$ ls
install_opencv4.10.0_Jetpack6.1.sh  install_opencv4.6.0_Jetpack5.sh  install_pyTorch_Xavier.sh
install_opencv4.5.0_Jetpack4.sh      install_opencv4.9.0_Jetpack6.0.sh  topics
jetson@yahboom:~/JEP/script$ bash install_opencv4.10.0_Jetpack6.1.sh
Do you want to remove the default OpenCV (yes/no)?
yes
** Remove other OpenCV first
[sudo] password for jetson:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Note, selecting 'libopencv3.4-java' for glob '*libopencv*'
Note, selecting 'libopencv4.5d-jni' for glob '*libopencv*'
Note, selecting 'libopencv-photo4.0' for glob '*libopencv*'
Note, selecting 'libopencv-videoio4.5d' for glob '*libopencv*'
Note, selecting 'libopencv-dnn4.0' for glob '*libopencv*'
Note, selecting 'libopencv-ml4.0' for glob '*libopencv*'
Note, selecting 'libopencv-objdetect4.5d' for glob '*libopencv*'
Note, selecting 'libopencv-gpu-dev' for glob '*libopencv*'
Note, selecting 'libopencv-videoio-dev' for glob '*libopencv*'
Note, selecting 'libopencv-superres4.5d' for glob '*libopencv*'
Note, selecting 'libopencv-objdetect-dev' for glob '*libopencv*'
Note, selecting 'libopencv-contrib4.5d' for glob '*libopencv*'
Note, selecting 'libopencv-videoio4.0' for glob '*libopencv*'
Note, selecting 'libopencv-superres-dev' for glob '*libopencv*'
Note, selecting 'libopencv4.0-java' for glob '*libopencv*'
Note, selecting 'libopencv-contrib-dev' for glob '*libopencv*'
Note, selecting 'libopencv4.1-java' for glob '*libopencv*'
Note, selecting 'libopencv-imgcodecs4.5d' for glob '*libopencv*'
Note, selecting 'libopencv4.2-java' for glob '*libopencv*'
Note, selecting 'libopencv-imgcodecs-dev' for glob '*libopencv*'
jetson@yahboom:~/JEP/script$
```

```
Jetson@yahboom: ~/JEP/script
-- Installing: /usr/local/lib/python3.10/dist-packages/cv2/samples/_init_.py
-- Installing: /usr/local/lib/python3.10/dist-packages/cv2/python-3.10/cv2.cpython-310-aarch64-linux-gnu.so
-- Set runtime path of "/usr/local/lib/python3.10/dist-packages/cv2/python-3.10/cv2.cpython-310-aarch64-linux-gnu.so" to "/usr/local/lib:/usr/local/cuda-12.6/lib64"
-- Installing: /usr/local/lib/python3.10/dist-packages/cv2/config-3.10.py
-- Installing: /usr/local/share/opencv4/haarcascades/haarcascade_eye.xml
-- Installing: /usr/local/share/opencv4/haarcascades/haarcascade_eye_tree_eyeglasses.xml
-- Installing: /usr/local/share/opencv4/haarcascades/haarcascade_frontalcatface.xml
-- Installing: /usr/local/share/opencv4/haarcascades/haarcascade_frontalcatface_extended.xml
-- Installing: /usr/local/share/opencv4/haarcascades/haarcascade_frontalface_alt.xml
-- Installing: /usr/local/share/opencv4/haarcascades/haarcascade_frontalface_alt2.xml
-- Installing: /usr/local/share/opencv4/haarcascades/haarcascade_frontalface_alt_tree.xml
-- Installing: /usr/local/share/opencv4/haarcascades/haarcascade_frontalface_default.xml
-- Installing: /usr/local/share/opencv4/haarcascades/haarcascade_fullbody.xml
-- Installing: /usr/local/share/opencv4/haarcascades/haarcascade_lefteye_2splits.xml
-- Installing: /usr/local/share/opencv4/haarcascades/haarcascade_license_plate_rus_16stages.xml
-- Installing: /usr/local/share/opencv4/haarcascades/haarcascade_lowerbody.xml
-- Installing: /usr/local/share/opencv4/haarcascades/haarcascade_profileface.xml
-- Installing: /usr/local/share/opencv4/haarcascades/haarcascade_righteye_2splits.xml
-- Installing: /usr/local/share/opencv4/haarcascades/haarcascade_russian_plate_number.xml
-- Installing: /usr/local/share/opencv4/haarcascades/haarcascade_smile.xml
-- Installing: /usr/local/share/opencv4/haarcascades/haarcascade_upperbody.xml
-- Installing: /usr/local/share/opencv4/lbpcascades/lbpcascade_frontalcatface.xml
-- Installing: /usr/local/share/opencv4/lbpcascades/lbpcascade_frontalface.xml
-- Installing: /usr/local/share/opencv4/lbpcascades/lbpcascade_frontalface_improved.xml
-- Installing: /usr/local/share/opencv4/lbpcascades/lbpcascade_profileface.xml
-- Installing: /usr/local/share/opencv4/lbpcascades/lbpcascade_silverware.xml
-- Installing: /usr/local/bin/opencv_annotation
-- Set runtime path of "/usr/local/bin/opencv_annotation" to "/usr/local/lib:/usr/local/cuda-12.6/lib64"
-- Installing: /usr/local/bin/opencv_visualisation
-- Set runtime path of "/usr/local/bin/opencv_visualisation" to "/usr/local/lib:/usr/local/cuda-12.6/lib64"
-- Installing: /usr/local/bin/opencv_interactive-calibration
-- Set runtime path of "/usr/local/bin/opencv_interactive-calibration" to "/usr/local/lib:/usr/local/cuda-12.6/lib64"
-- Installing: /usr/local/bin/opencv_version
-- Set runtime path of "/usr/local/bin/opencv_version" to "/usr/local/lib:/usr/local/cuda-12.6/lib64"
-- Installing: /usr/local/bin/opencv_model_diagnostics
-- Set runtime path of "/usr/local/bin/opencv_model_diagnostics" to "/usr/local/lib:/usr/local/cuda-12.6/lib64"
** Install opencv 4.10.0 successfully
** Bye :)
jetson@yahboom:~/JEP/script$
```

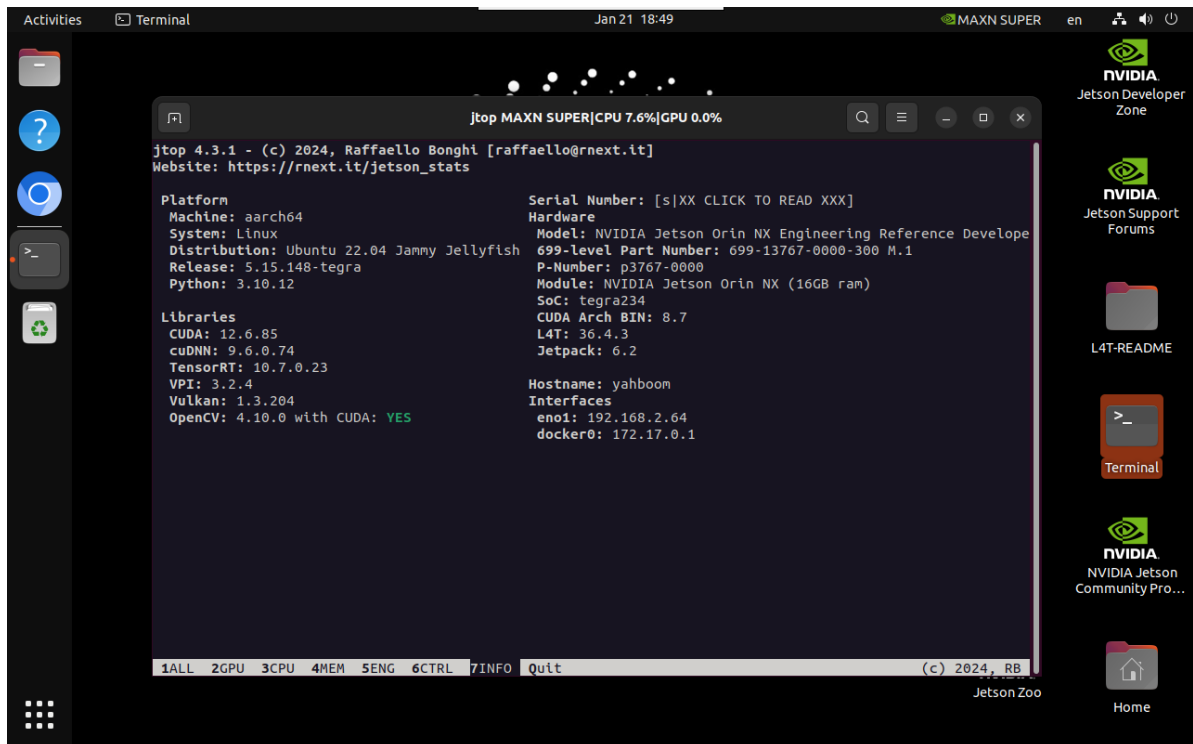
## Verify the environment

```
python3 -c "import cv2; print(cv2.getBuildInformation())" | grep GStreamer
python3 -c "import ultralytics; print(ultralytics.__version__)"
python3 -c "import torch; print(torch.__version__);
print(torch.cuda.is_available())"
python3 -c "import torchvision; print(torchvision.__version__)"
python3 -c "import numpy; print(numpy.__version__)"
jtop
```



A terminal window on a Jetson device showing the installation of various Python libraries. The user is logged in as 'jetson' on a machine named 'yahboom'. The terminal output shows the following commands and results:

```
jetson@yahboom:~$ python3 -c "import cv2; print(cv2.getBuildInformation()) | grep GStreamer"
GStreamer: YES (1.20.3)
jetson@yahboom:~$ python3 -c "import ultralytics; print(ultralytics.__version__)"
8.3.65
jetson@yahboom:~$ python3 -c "import torch; print(torch.__version__); print(torch.cuda.is_available())"
2.5.0a0+872d972e41.nv24.08
True
jetson@yahboom:~$ python3 -c "import torchvision; print(torchvision.__version__)"
0.20.0a0+afc54f7
jetson@yahboom:~$ python3 -c "import numpy; print(numpy.__version__)"
1.23.5
jetson@yahboom:~$
```



A terminal window on a Jetson device showing the output of the 'jtop' command. The terminal output shows the following information:

```
jtop 4.3.1 - (c) 2024, Raffaello Bonghi [raffaello@rnext.it]
Website: https://rnext.it/jetson_stats

Platform
Machine: aarch64
System: Linux
Distribution: Ubuntu 22.04 Jammy Jellyfish
Release: 5.15.148-tegra
Python: 3.10.12

Serial Number: [s|XX CLICK TO READ XXX]
Hardware
Model: NVIDIA Jetson Orin NX Engineering Reference Develop
699-level Part Number: 699-13767-0000-300 M.1
P-Number: p3767-0000
Module: NVIDIA Jetson Orin NX (16GB ram)
Soc: tegra234
CUDA Arch BIN: 8.7
L4T: 36.4.3
Jetpack: 6.2

Libraries
CUDA: 12.6.85
cuDNN: 9.6.0.74
TensorRT: 10.7.0.23
VPI: 3.2.4
Vulkan: 1.3.204
OpenCV: 4.10.0 with CUDA: YES

Hostname: yahboom
Interfaces
eno1: 192.168.2.64
docker0: 172.17.0.1

1ALL 2GPU 3CPU 4MEM 5ENG 6CTRL 7INFO Quit (c) 2024, RB
Jetson Zoo
```

## References

<https://docs.ultralytics.com/guides/nvidia-jetson/>

<https://github.com/AastaNV/JEP>