Local deployment of yolo training environment

Environment Configuration

In this section, we will demonstrate how to deploy the Yolo v5 environment locally and train a classification (recognition) model.

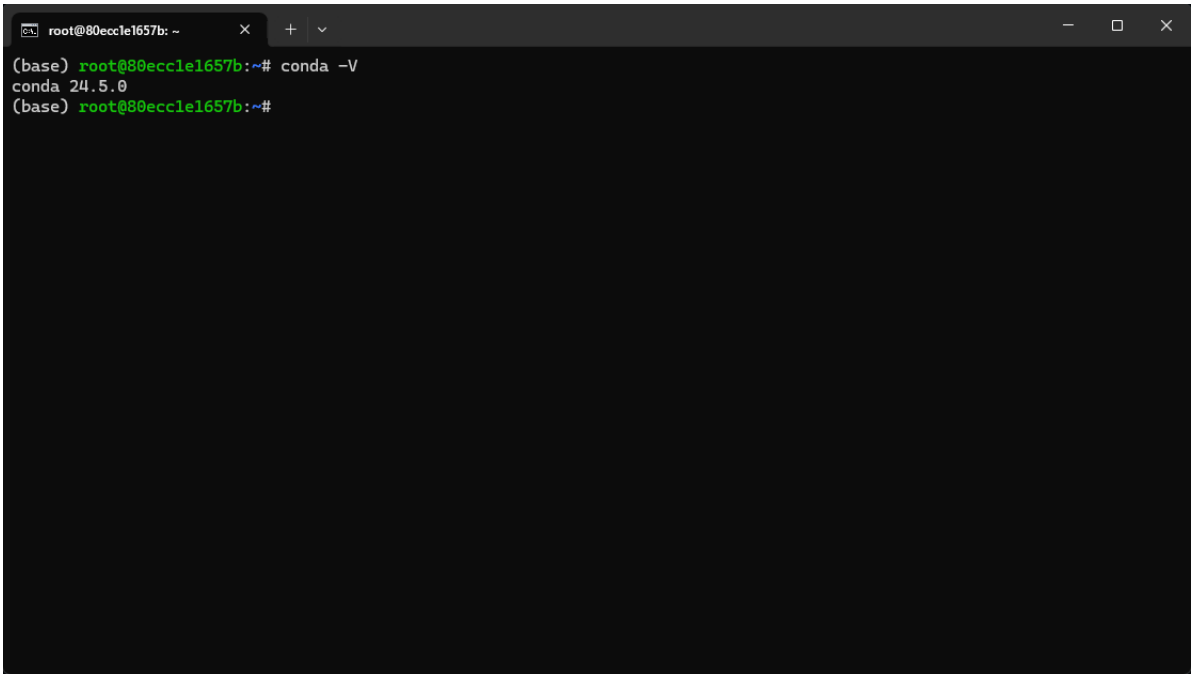
The operating environment we demonstrate is as follows:

System: Ubuntu 22.04

GPU: 4090D*1

CUDA version: 12.4

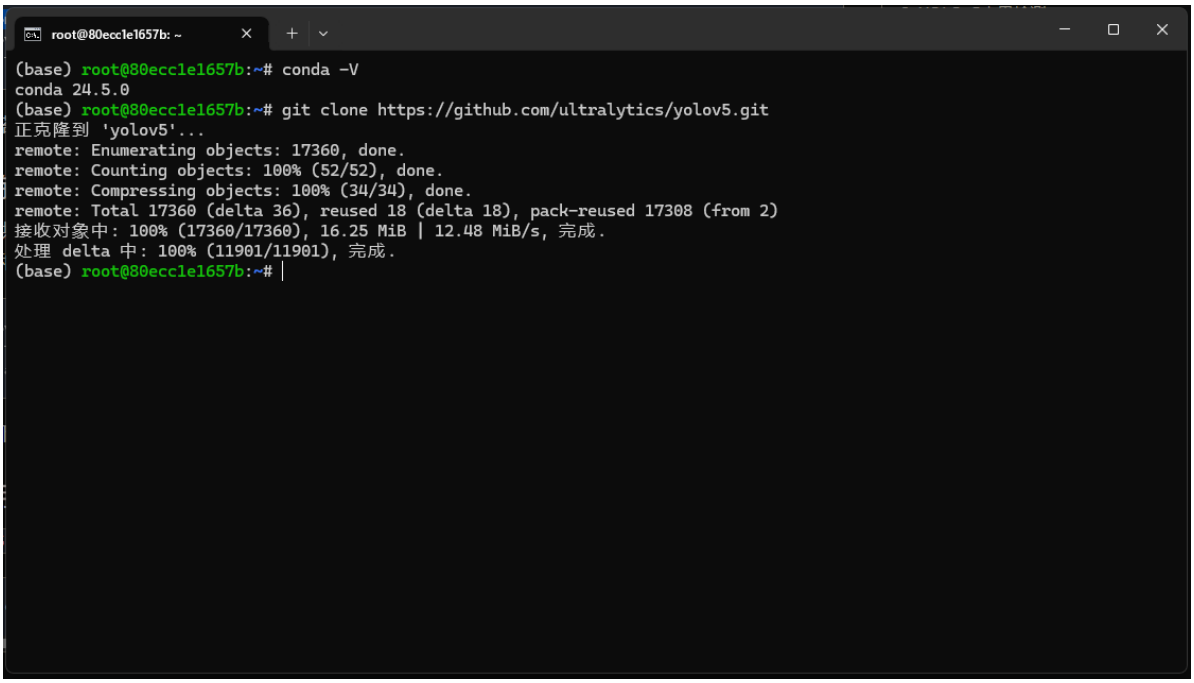
The system has pre-installed Miniconda3_3.10



Download and install Yolo v5 environment dependencies

Enter the command

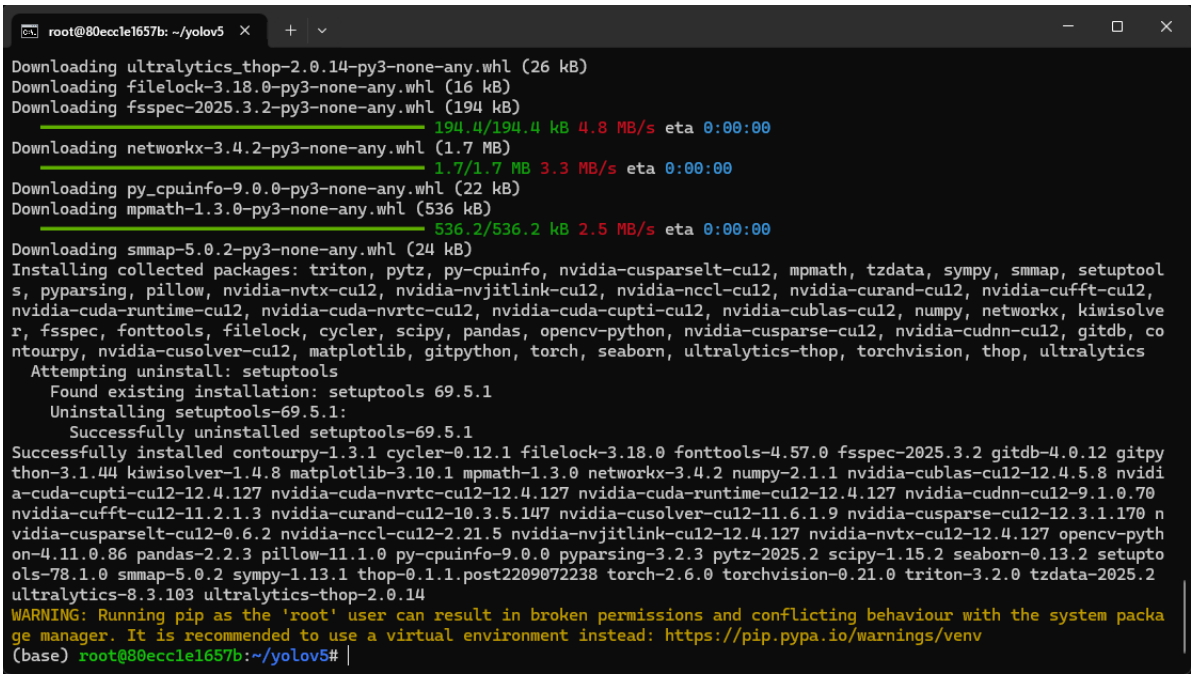
```
git clone https://github.com/ultralytics/yolov5.git
```



implement

```
cd yolov5
pip install -r requirements.txt
```

> This part of the file contains a lot of content, please be patient



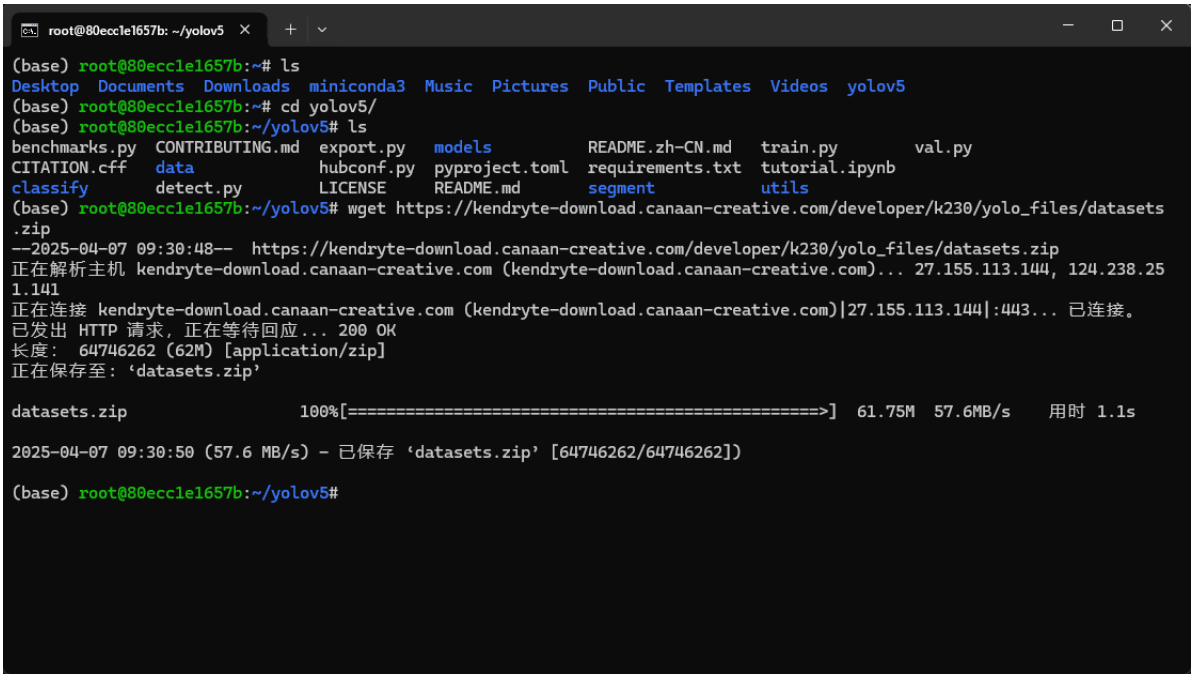
Preparing training data

> Here we use the training set officially provided by Canaan Technology as sample data

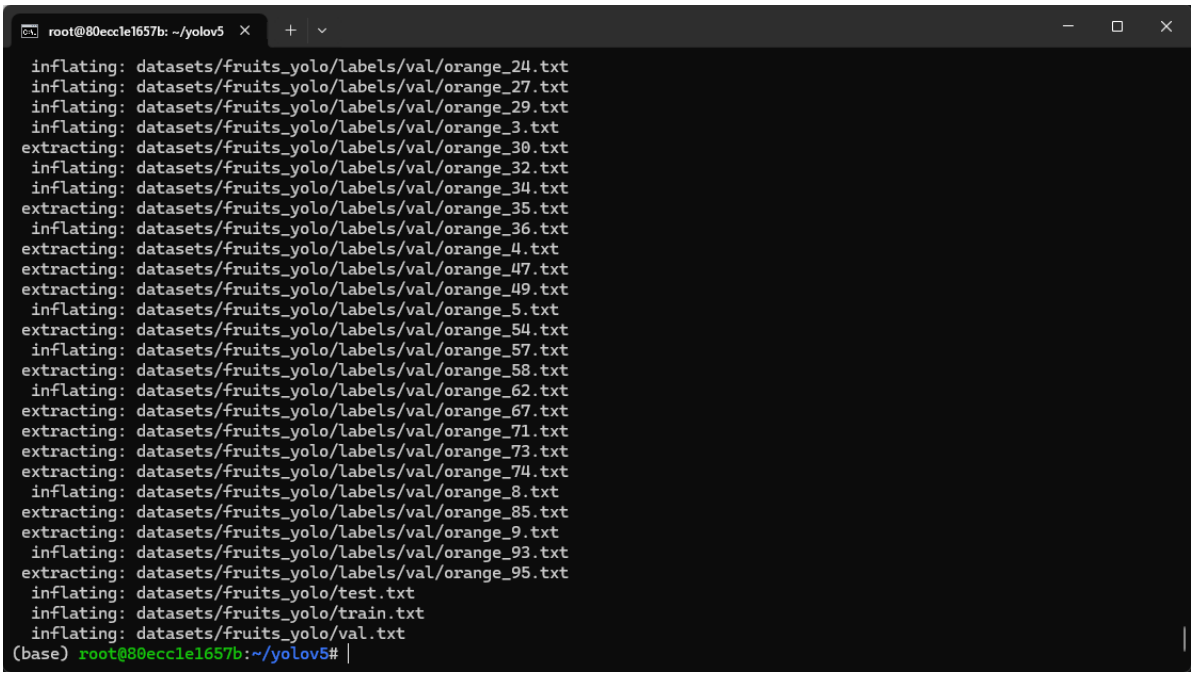
> Please download the sample dataset provided. The sample dataset contains classification, detection and segmentation datasets for three types of fruits (apple, banana and orange). Unzip the dataset to `yolov5` the directory and use it `fruits_cls` as the dataset for the fruit classification task.

We execute the following code

```
wget https://kendryte-download.canaan-creative.com/developer/k230/yolo_files/datasets.zip
```




```
unzip datasets.zip
```



Use YOLOv5 to train a fruit classification model

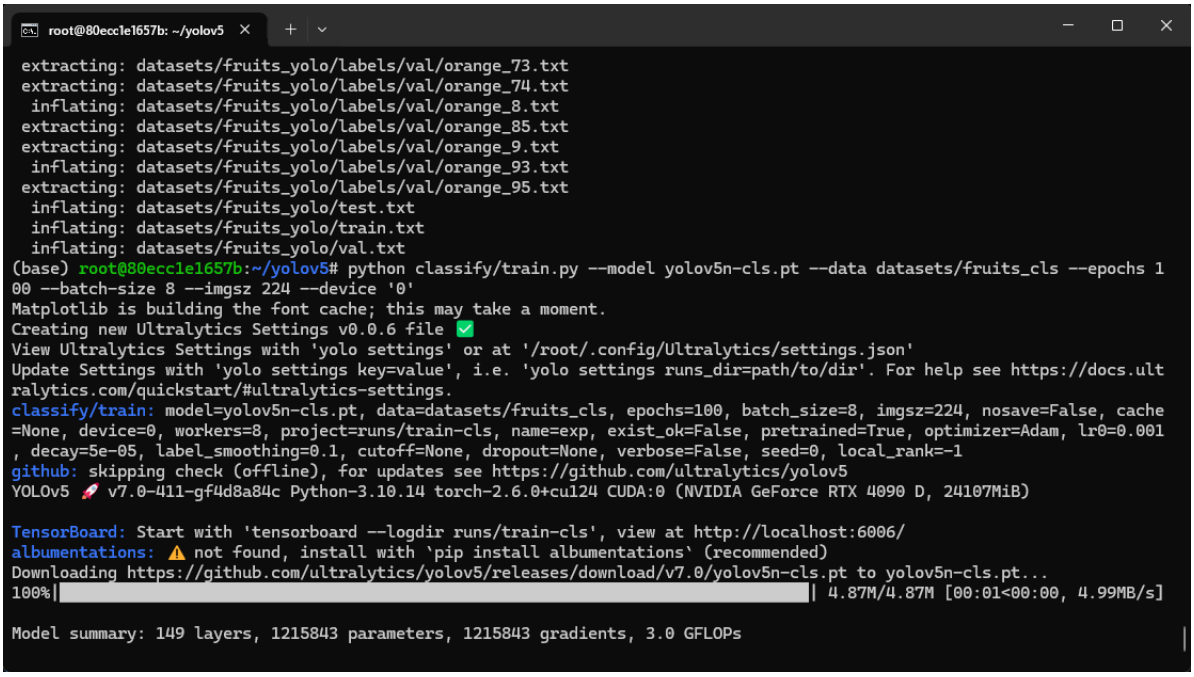
> `yolov5` Execute the command in the directory and use `yolov5` to train three types of fruit classification models:

We enter the yolov5 directory (~/yolov5 in the example)

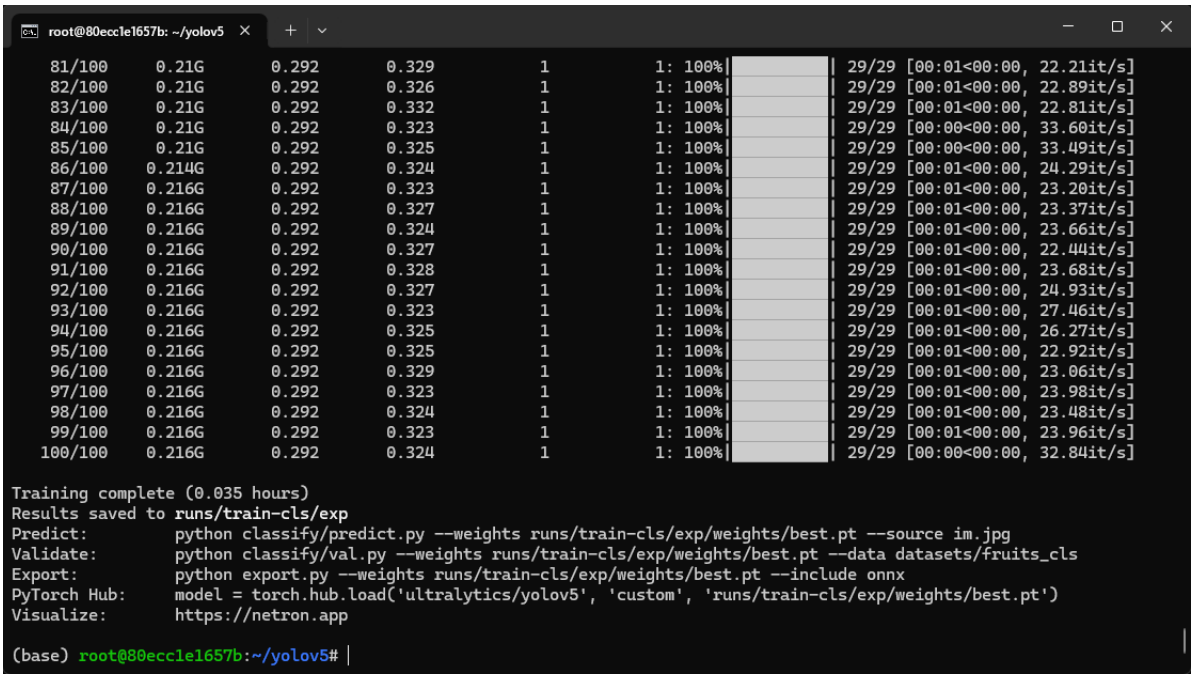
Execute the following code to start training

```
python classify/train.py --model yolov5n-cls.pt --data datasets/fruits_cls --
epochs 100 --batch-size 8 --imgsz 224 --device '0'
```

If an interface similar to the one below appears, it means that training has started.



After the training is successfully completed, the output is as follows



Convert the trained model to a kmodel that can be recognized by K230

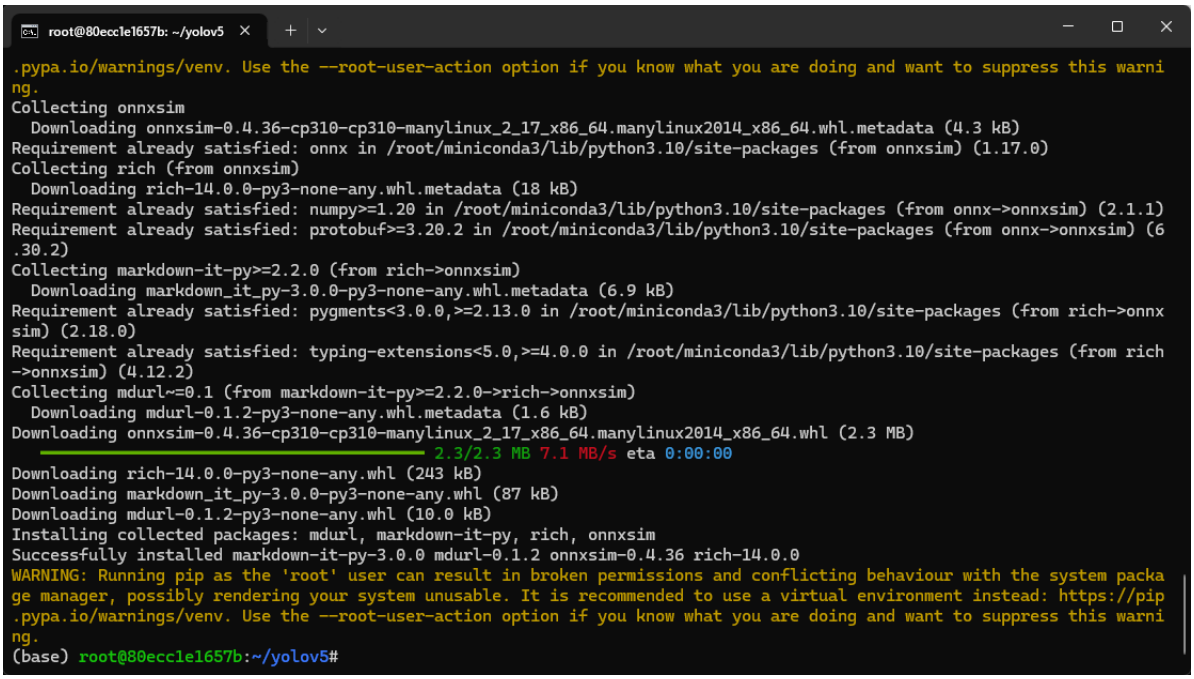
The model we trained with yolov5 is best.pt with the suffix pt

In order to use it on K230, we need to convert it into a model in kmodel format

Download the conversion tool

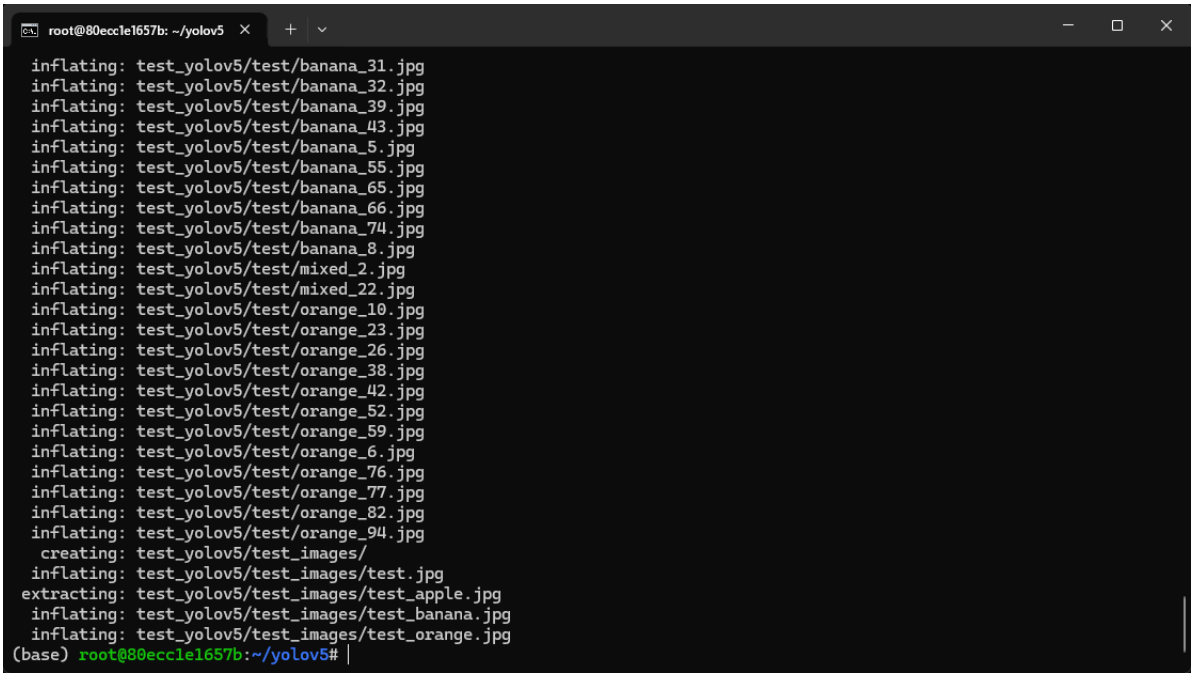
Execute the following code to install the required tools

```
sudo apt-get install -y dotnet-sdk-7.0
pip install --upgrade pip
pip install nncase==2.9.0
pip install nncase-kpu==2.9.0
pip install onnx
pip install onnxruntime
pip install onnxsim
```



Download the script tool and `test_yolov5.zip` unzip the model conversion script tool to `yolov5` the directory;

```
wget https://kendryte-download.canaan-
creative.com/developer/k230/yolo_files/test_yolov5.zip
unzip test_yolov5.zip
```



Start model format conversion

Step 1: Convert pt format to onnx format

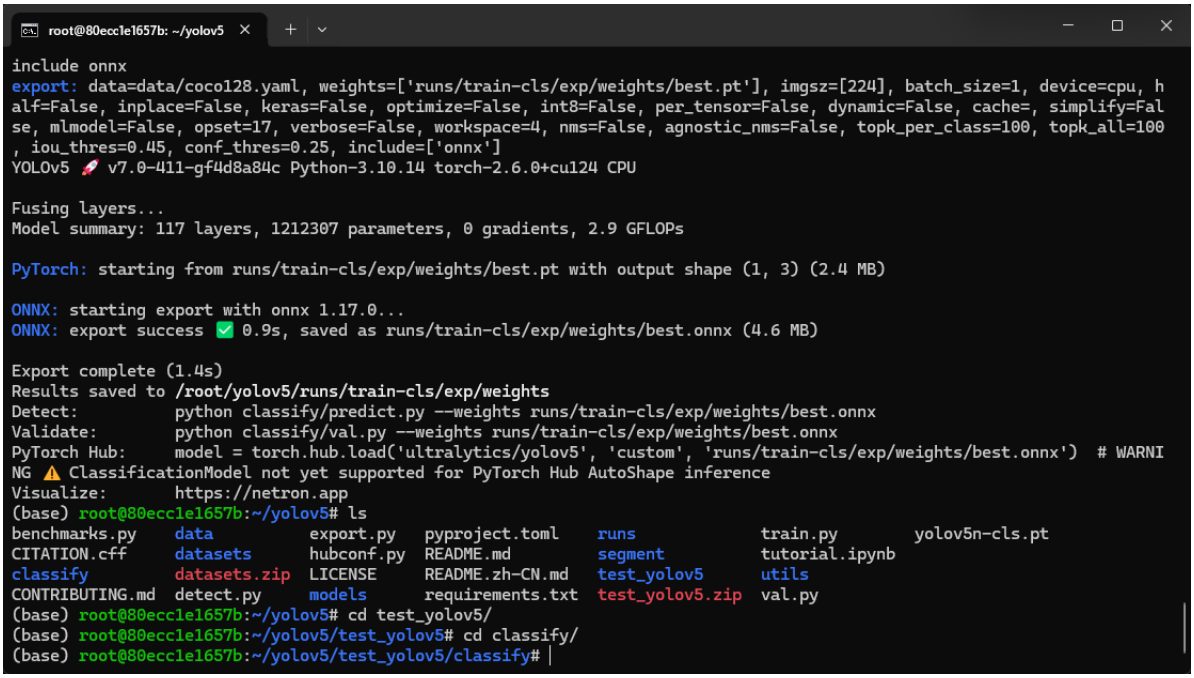
```
python export.py --weight runs/train-cls/exp/weights/best.pt --imgsz 224 --batch
1 --include onnx
```

Note that "runs/train-cls/exp/weights/best.pt" here is the path of the pt model we trained.

> If the previous steps are done exactly as the tutorial, then the path here does not need to be modified

Step 2: Enter the test_yolov5/classify directory

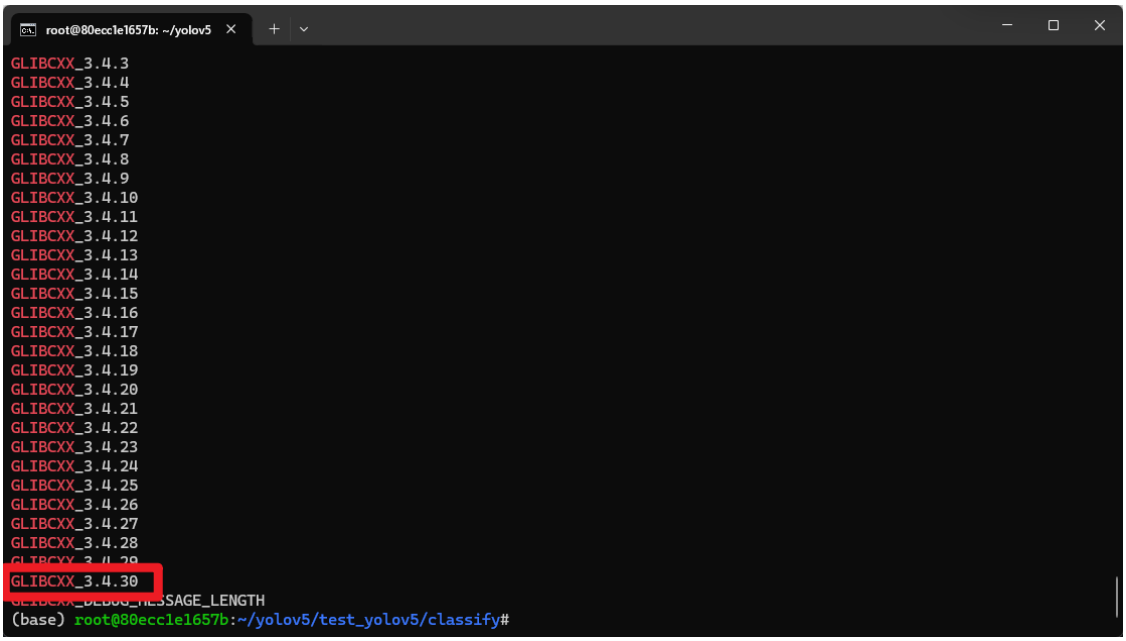
```
cd test_yolov5/classify
```



Execute model conversion instructions

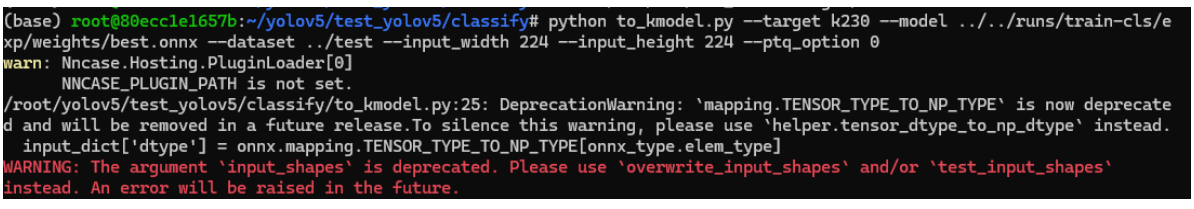
```
python to_kmodel.py --target k230 --model ../../runs/train-cls/exp/weights/best.onnx --dataset ../test --input_width 224 --input_height 224 --ptq_option 0
```

> Note: An error may occur at this time: RuntimeError: /root/miniconda3/bin/../lib/libstdc++.so.6: version `GLIBCXX_3.4.30' not found (required by /usr/lib/dotnet/host/fxr/7.0.19/libhostfxr.so): Success
>
> Solution:
>
> Check if GLIBCXX_3.4.30 exists
>
> ```
> strings /usr/lib/x86_64-linux-gnu/libstdc++.so.6 | grep GLIBCXX
> ```
>
> If there is one in the output, it means that the file is not really missing, but the version of libstdc++ in the virtual environment is lower than the version of the libstdc++ library in the system.



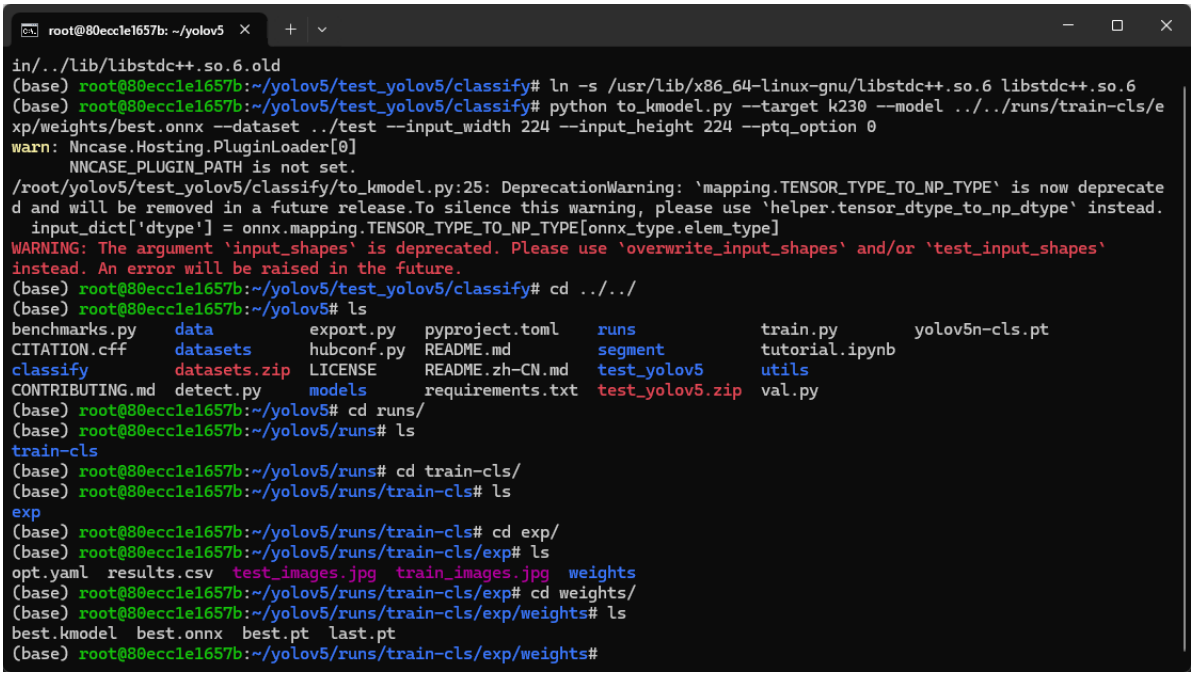
> At this point we only need to execute the following command
>
> Delete the libstdc++.so.6 file in the virtual environment (or rename it to another name, here we rename it to libstdc++.so.6.old)
>
> ```
> mv /root/miniconda3/bin/../lib/libstdc++.so.6 /root/miniconda3/bin/../lib/libstdc++.so.6.old
> ```
>
> Then create a soft link and let the libstdc++.so.6 called by the virtual environment point to the libstdc++.so.6 that comes with the system.
>
> ```
> ln -s /usr/lib/x86_64-linux-gnu/libstdc++.so.6 libstdc++.so.6
> ```

After the conversion command is completed, the output is as follows



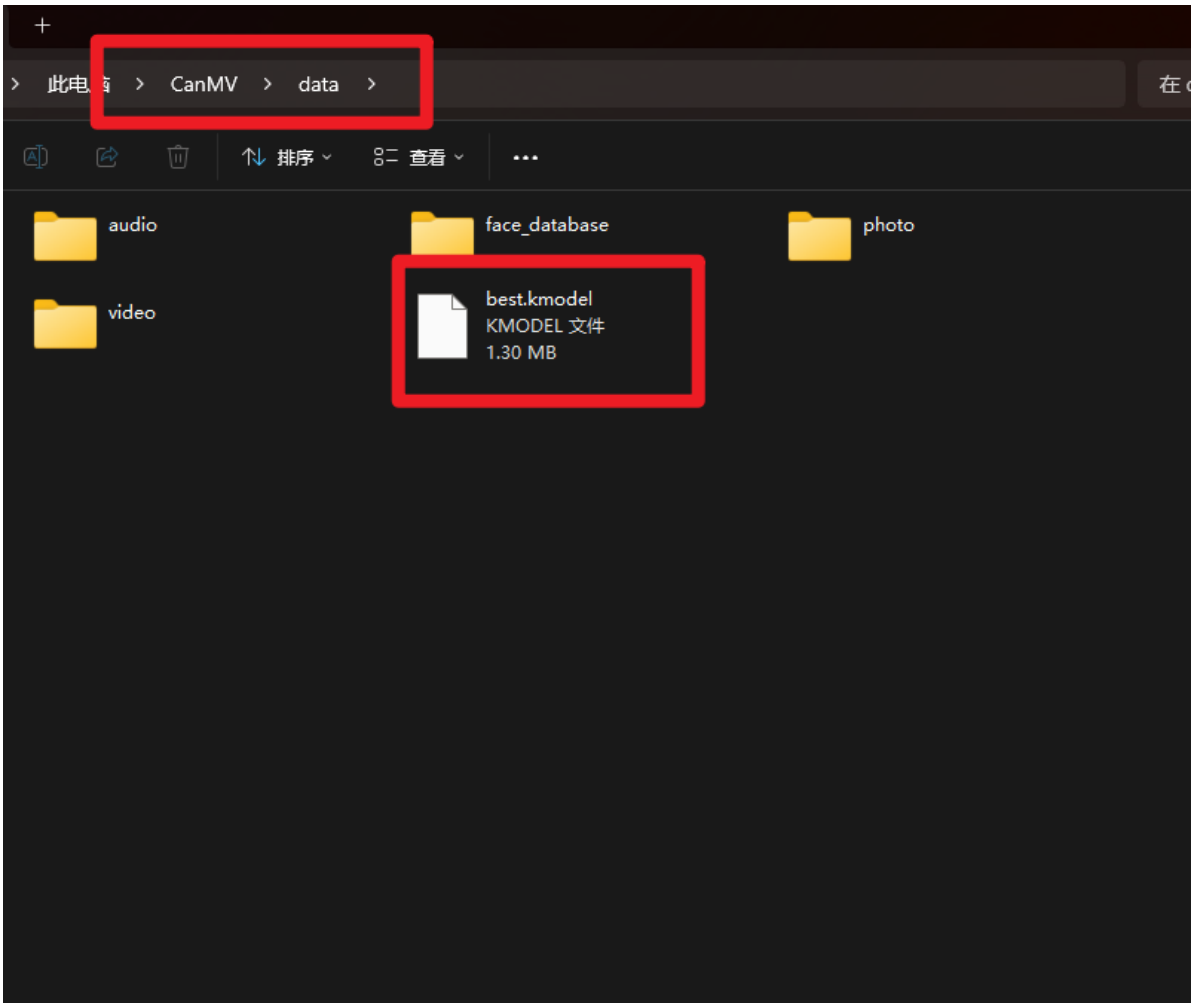
> WARNING can be ignored here

The generated model is in the directory ~/yolov5/runs/train-cls/exp/weights



The name is best.kmodel

We copy this best.kmodel to the data directory of our K230



Then open CanMV IDE, copy the following code and click Run

```
from libs.PipeLine import PipeLine, ScopedTiming
```

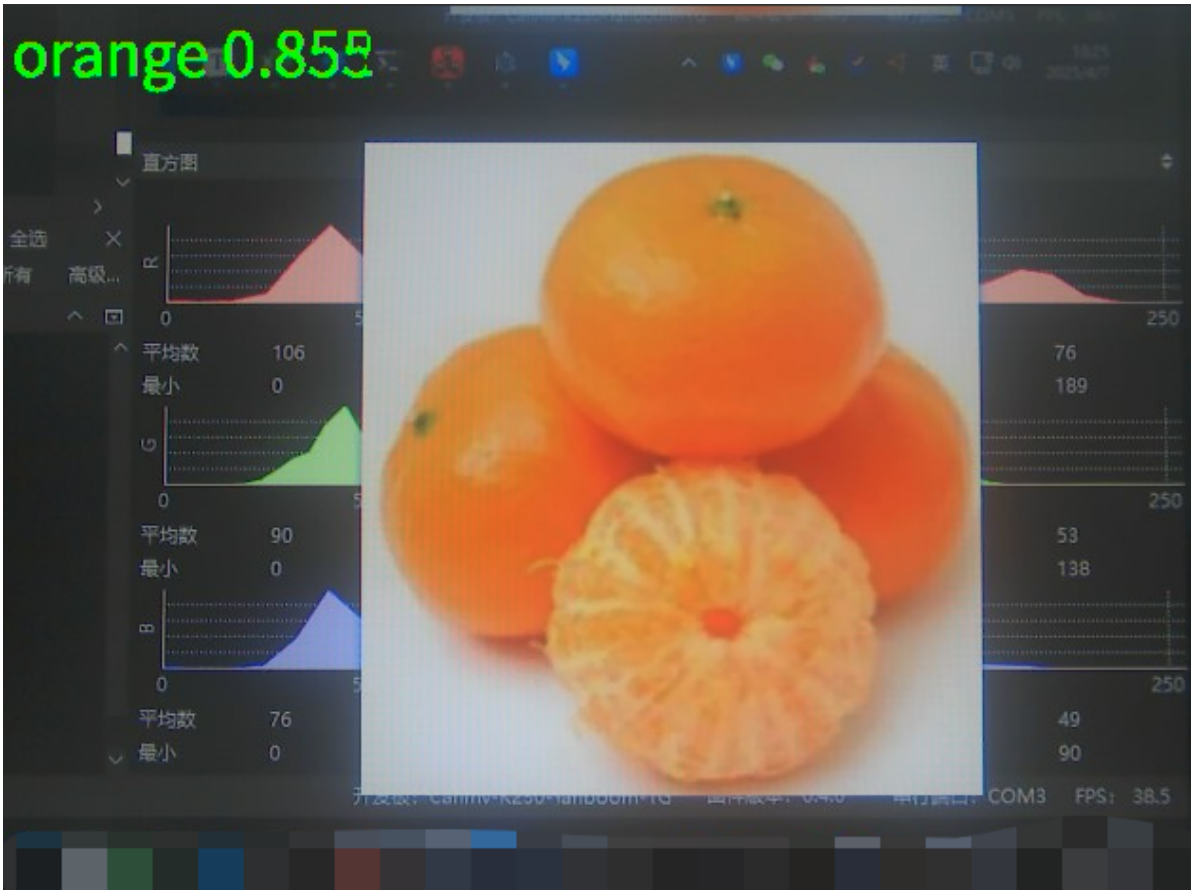
```
from libs.YOLO import YOLOv5
import os,sys,gc
import ulab.numpy as np
import image

if __name__=="__main__":

    rgb888p_size=[1280,720]
    display_size=[640,480]
    # 模型路径 Model path
    kmodel_path="/data/best.kmodel"
    labels = ["apple","banana","orange"]
    confidence_threshold = 0.5
    model_input_size=[224,224]
    # 初始化PipeLine  Initialize PipeLine

 pl=PipeLine(rgb888p_size=rgb888p_size,display_size=display_size,display_mode="l
cd")
    pl.create()
    # 初始化YOLOv5实例  Initialize the YOLOv5 instance

 yolo=YOLOv5(task_type="classify",mode="video",kmodel_path=kmodel_path,labels=la
bels,rgb888p_size=rgb888p_size,model_input_size=model_input_size,display_size=di
splay_size,conf_thresh=confidence_threshold,debug_mode=0)
    yolo.config_preprocess()
    try:
        while True:
            os.exitpoint()
            with ScopedTiming("total",1):
                # 逐帧推理 Frame-by-frame reasoning
                img = pl . get_frame ()
                res = yolo . run ( img )
                yolo . draw_result ( res , pl . osd_img )
                pl . show_image ()
                gc . collect ()
    except  Exception  as  e :
        sys.print_exception ( e )
    finally :
        yolo.deinit ( )
        pl . destroy ()
```

Let's test the effect

Identify Apples

Identify bananas

Identify oranges



You can see that this routine can run successfully.

Other considerations

1. Environment configuration, Yolov5 environment dependencies, and model conversion tools only need to be downloaded once, and no re-download is required for subsequent training
2. If the speed of pip download is much lower than the actual network bandwidth, please check whether the pip mirror source is configured.
3. The model trained with the current dataset may identify non-banana objects other than oranges/apples as bananas. This is normal. If a more accurate model is needed, a training set with a larger amount of data can be prepared for training.