

Object detection of yolov5 on Android

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Object detection of yolov5 on Android

Hardware and software environment

- yolov5
- ncnn
- android studio 4.1.2
- oneplus 8
- pytorch 1.6
- onnx
- netron

Preface

The previous articles , We've talked about it in detail yolov5 Detection of 、 Training 、 Visualization, etc , This article continues to yolov5 The topic of , Let's take a look at , How to be in android To use yolov5 For target detection ?



What is? ncnn

The following paragraph is the official definition

`ncnn` Tencent is an open source high-performance neural network forward computing framework specially optimized for mobile terminals. `ncnn` From the beginning of design, We should deeply consider the deployment and use of mobile terminals, There is no need for a third party to rely on, Cross platform, Mobile terminal `cpu` Faster than all known open source frameworks. be based on `ncnn`, Developers can easily transplant deep learning algorithms to mobile phones for efficient execution, Develop artificial intelligence APP, take AI Bring it to your fingertips.

at present `ncnn` Has supported most of `cnn` The Internet, Including the `yolov5`

- Classical CNN: VGG AlexNet GoogleNet Inception ...
- Practical CNN: ResNet DenseNet SEnet FPN ...
- Light-weight CNN: SqueezeNet MobileNetV1/V2/V3 ShuffleNetV1/V2 MNasNet ...
- Face Detection: MTCNN RetinaFace ...

- Detection: VGG–SSD MobileNet–SSD SqueezeNet–SSD MobileNetV2–SSDLite MobileNetV3–SSDLite ...
- Detection: Faster–RCNN R–FCN ...
- Detection: YOLOV2 YOLOV3 MobileNet–YOLOV3 YOLOV4 YOLOV5 ...
- Segmentation: FCN PSPNet UNet YOLACT ...
- Pose Estimation: SimplePose ...

Project operation

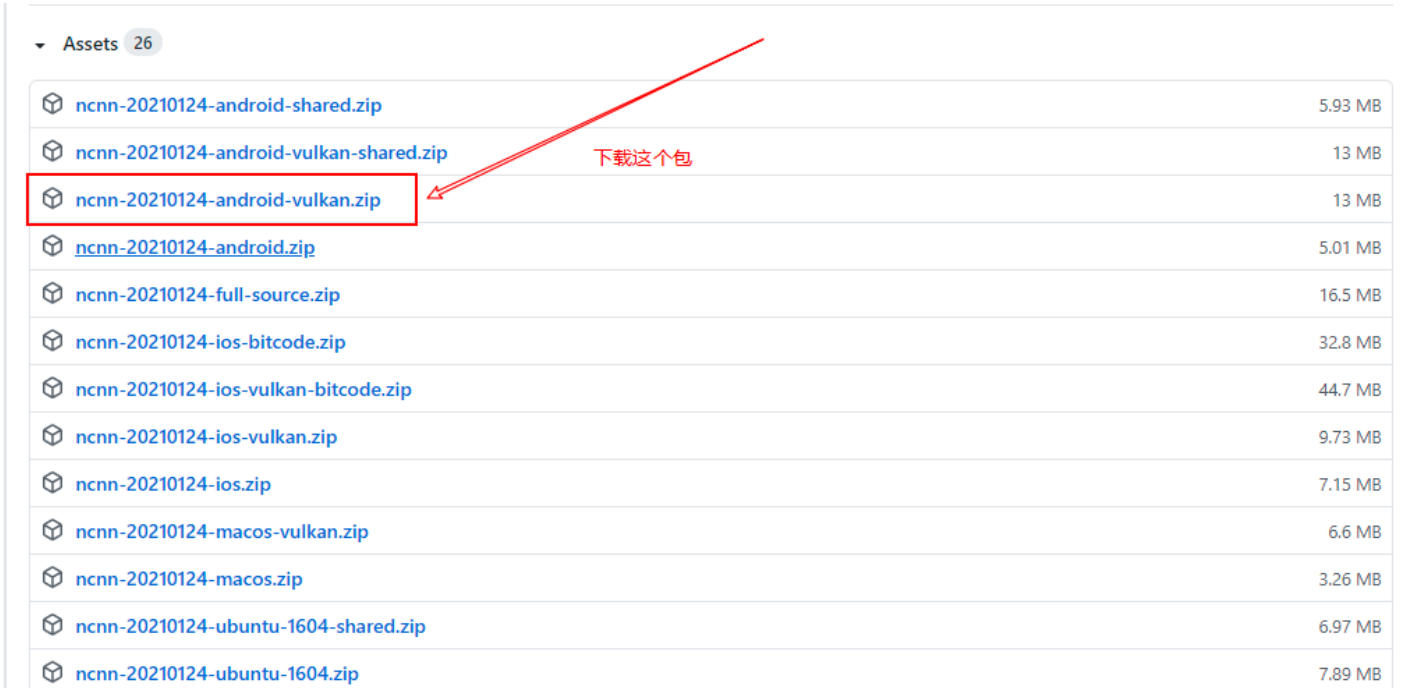
About the basic environment , I need to use android Development environment of , image android studio、 sdk、 ndk wait , This article does not introduce , If there's a problem , You can leave a message in the message area .

Let's just pull yolov5 for android Source code

```
git clone https://github.com/nihui/ncnn-android-yolov5
```

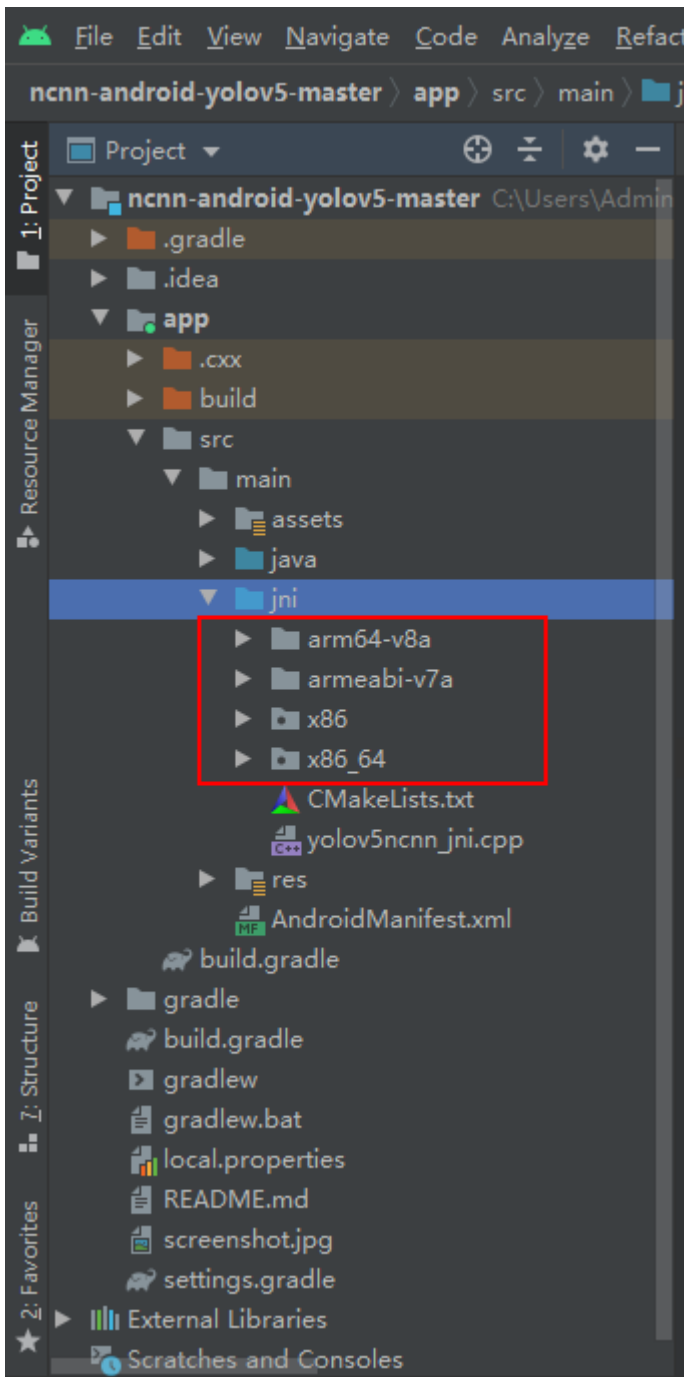
Copy code

Then come to ncnn Version release page for , Download the compiled package [github.com/Tencent/ncn...](https://github.com/Tencent/ncnn), If you're interested , It can also be done through ndk Compile by yourself



Assets	26
ncnn-20210124-android-shared.zip	5.93 MB
ncnn-20210124-android-vulkan-shared.zip	13 MB
ncnn-20210124-android-vulkan.zip	13 MB
ncnn-20210124-android.zip	5.01 MB
ncnn-20210124-full-source.zip	16.5 MB
ncnn-20210124-ios-bitcode.zip	32.8 MB
ncnn-20210124-ios-vulkan-bitcode.zip	44.7 MB
ncnn-20210124-ios-vulkan.zip	9.73 MB
ncnn-20210124-ios.zip	7.15 MB
ncnn-20210124-macos-vulkan.zip	6.6 MB
ncnn-20210124-macos.zip	3.26 MB
ncnn-20210124-ubuntu-1604-shared.zip	6.97 MB
ncnn-20210124-ubuntu-1604.zip	7.89 MB

Download, unzip and copy to ncnn-android-yolov5 Project
app/src/main/jni Under the table of contents , The directory structure
is like this



And then modify the `CMakeLists.txt`, Will be one of the `ncnn_DIR` Change the value of the variable to

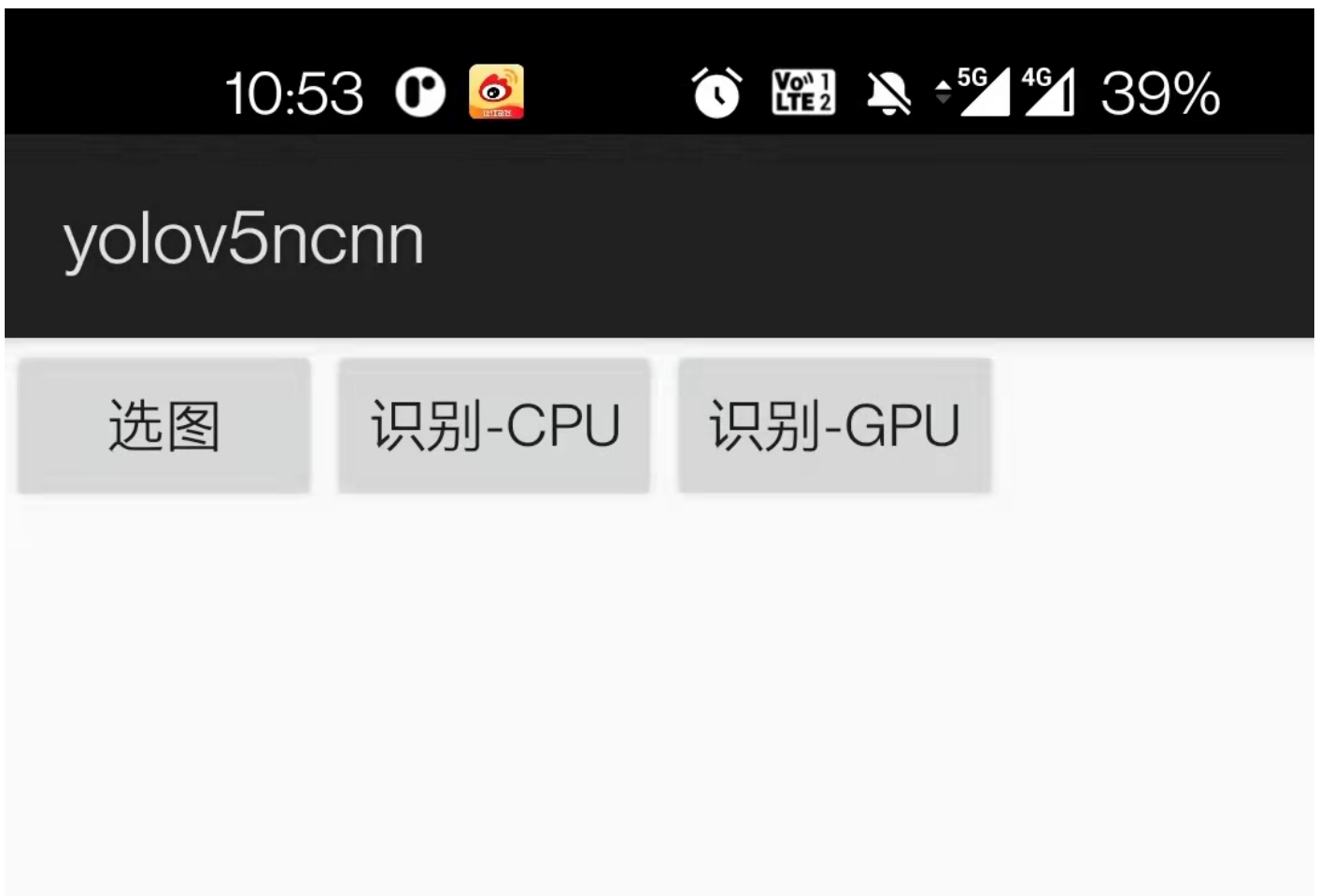
```
set(ncnn_DIR ${CMAKE_SOURCE_DIR}/${ANDROID_ABI}/lib/cmake/ncnn)
```

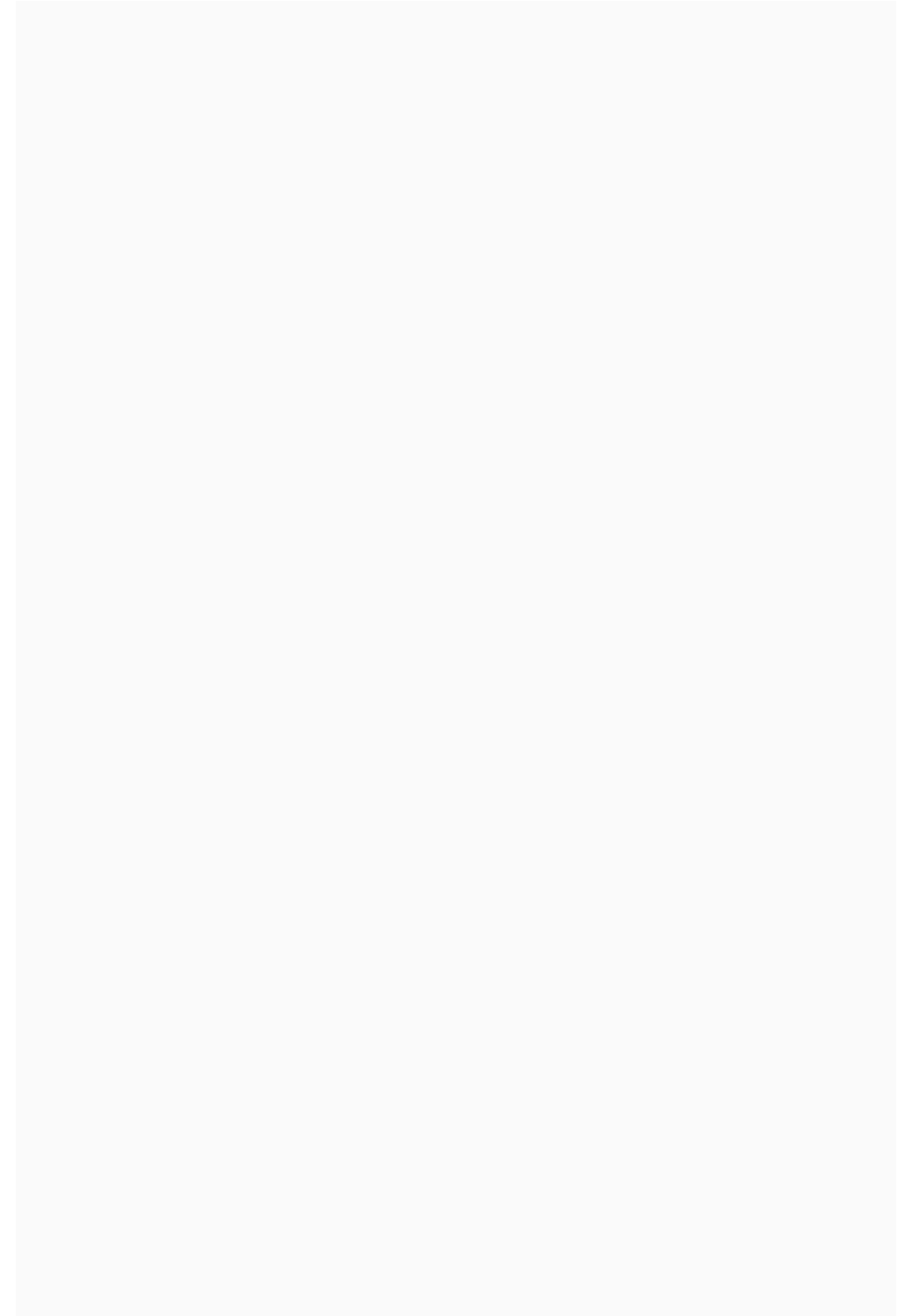
Copy code

```
d.gradle (ncnn-android-yolov5-master) × MainActivity.java × CMakeLists.txt ×  
project(yolov5ncnn)  
  
cmake_minimum_required(VERSION 3.4.1)  
  
set(ncnn_DIR ${CMAKE_SOURCE_DIR}/${ANDROID_ABI}/lib/cmake/ncnn)  
find_package(ncnn REQUIRED)  
  
add_library(yolov5ncnn SHARED yolov5ncnn_jni.cpp)  
  
target_link_libraries(yolov5ncnn  
    ncnn  
  
    jnigraphics  
)
```

After saving, you can compile the project .

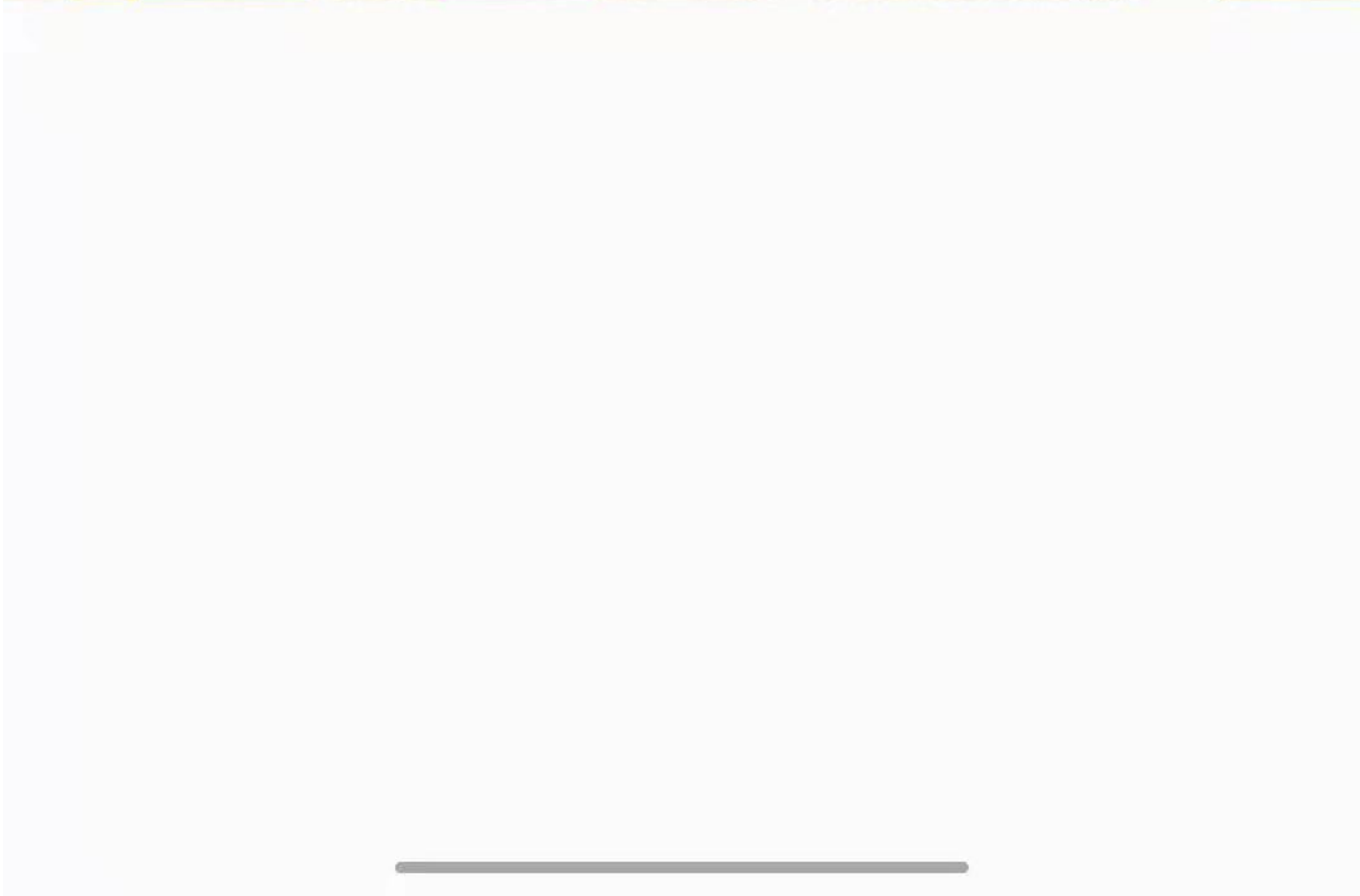
Here we use real machines to test , You need to turn on the developer mode of mobile phones by yourself , allow USB debugging ,APP Open after installation , The front page is like this





The interface layout is very simple , There are only three buttons in all , A map selection , A use CPU testing , A use GPU testing . Found by testing CPU It's faster than GPU Twice as slow , my onePlus 8 Of GPU The speed is only 5fps.





4:30

VoLTE 1

5G

4G

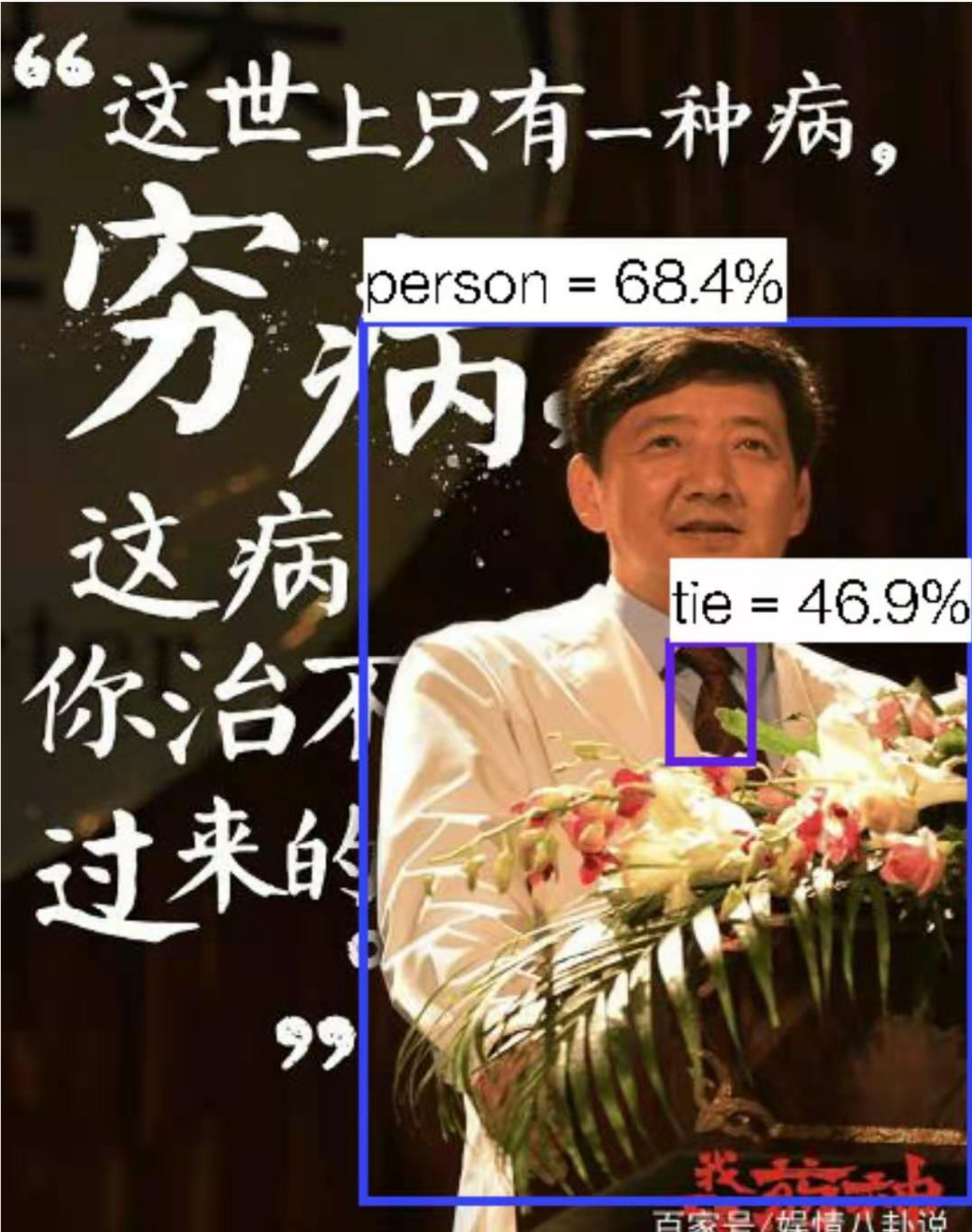
99%

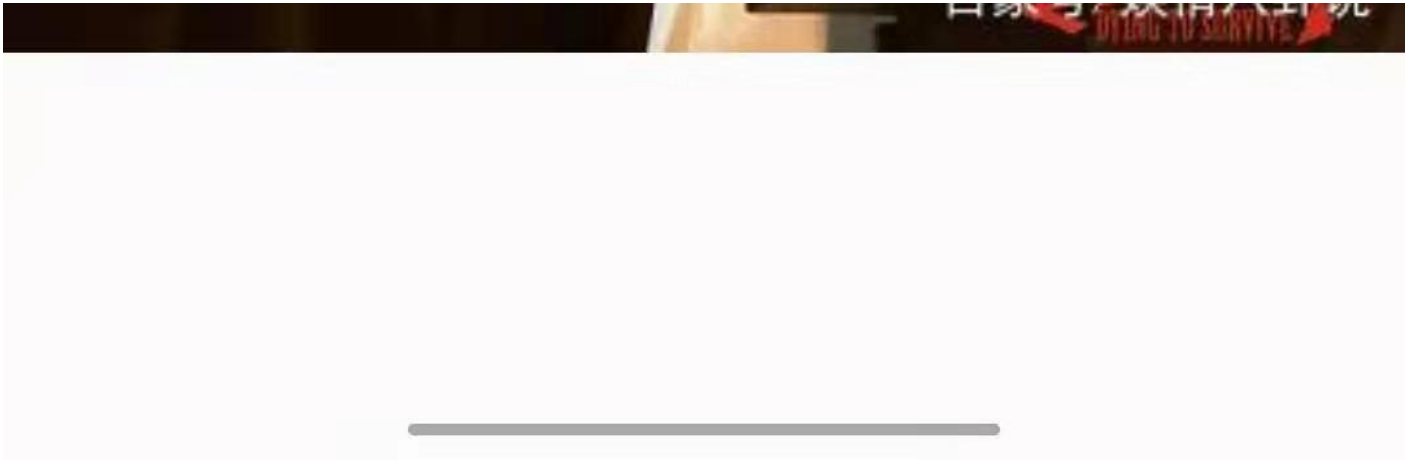
yolov5ncnn

选图

识别-CPU

识别-GPU





How to use your own model

When we train our detection model , You need an intermediary , Through it , You can transform between different frameworks . open Neural Network Exchange abbreviation ONNX, It means open neural network exchange format , It's the intermediary we need .

yolov5 Please refer to this article xugaoxiang.com/2020/07/02/..., As a test , We also use the mask detection model trained above

Install dependency library

```
pip install onnx coremltools onnx-simplifier
```

Copy code

Carry out orders

```
python models/export.py --weights runs/exp2/weights/best.pt
```

Copy code

```

Removing op "345" (type: const)
Removing op "344" (type: const)
Removing op "342" (type: const)
Removing op "339" (type: const)
Removing op "334" (type: const)
Removing op "332" (type: const)
Removing op "320" (type: const)
Removing op "319" (type: const)
Removing op "317" (type: const)
Removing op "314" (type: const)
Removing op "311" (type: const)
Removing op "310" (type: const)
Running MIL optimization passes: 100% | 17/17 [00:00<00:00, 71.25 passes/s]
Performing passes for nn_backend: "nn_backend::commingle_loop_vars"
Performing passes for nn_backend: "nn_backend::handle_return_inputs_as_outputs"
Performing passes for nn_backend: "common::const_elimination"
Performing passes for nn_backend: "common::dead_code_elimination"
Performing passes for nn_backend: "nn_backend::handle_unused_inputs"
Performing passes for nn_backend: "nn_backend::alert_return_type_cast"
Translating MIL ==> MLModel Ops: 100% | 944/944 [00:01<00:00, 937.56 ops/s]
CoreML export success, saved as runs/exp2/weights/best.mlmodel

Export complete. Visualize with https://github.com/lutzroeder/netron.
(pytorch1.6) xugaoxiang@1070Ti:~/Works/github/yolov5_v3/yolov5-3.0$

```

At the same time best.pt The same level directory , Also generated best.onnx、 best.mlmodel and best.torchscript.pt

```

(pytorch1.6) xugaoxiang@1070Ti:~/Works/github/yolov5_v3/yolov5-3.0$ ls runs/exp2/weights/
best.mlmodel best.onnx best.pt best.torchscript.pt last.pt
(pytorch1.6) xugaoxiang@1070Ti:~/Works/github/yolov5_v3/yolov5-3.0$

```

I need to remind you that , The above export operation is in pytorch1.7 and yolov5 v4.0 Errors will be reported on the version , My environment here is pytorch1.6、 yolov5 3.0 edition . The error information is as follows

```

Converting op 143 : listconstruct
Adding op '143' of type const
Converting op 144 : listconstruct
Adding op '144' of type const
Converting op 145 : listconstruct
Adding op '145' of type const
Converting op x.2 : _convolution
Converting Frontend ==> MIL Ops: 3% | 
| 21/620 [00:00<00:00, 1350.49 ops/s]
CoreML export failure: unexpected number of inputs for node x.2
(_convolution): 13

Export complete (12.83s). Visualize with
https://github.com/lutzroeder/netron.
Copy code

```

This is a `coremltools` One of the bug. For links, please see github.com/ultralytics...

Next, use the tool `onnx-simplifier` To simplify the `onnx`, Carry out orders

```
python -m onnxsim runs/exp2/weights/best.onnx
runs/exp2/weights/best-sim.onnx
```

Copy code

```
(pytorch1.6) xugaixiang@1070Ti:~/Works/github/yolov5_v3/yolov5-3.0$ python -m onnxsim runs/exp2/weights/best.onnx runs
/exp2/weights/best-sim.onnx
Simplifying...
Checking 0/3...
Checking 1/3...
Checking 2/3...
Ok!
(pytorch1.6) xugaixiang@1070Ti:~/Works/github/yolov5_v3/yolov5-3.0$
```

Let's start compiling `ncnn`, First, prepare the basic environment

```
sudo apt install build-essential libopencv-dev cmake
```

Copy code

Compilation and installation `protobuf` Dependency Library

```
git clone https://github.com/protocolbuffers/protobuf.git
cd protobuf
git submodule update --init --recursive
./autogen.sh
./configure
make
make install
sudo ldconfig
```

Copy code

After compiling and installing , You can check it out `protobuf` Version number of


```
xugaoliang@ubuntu:~/Works/ncnn/build$ protoc --version  
libprotoc 3.14.0
```

Next , Need to compile ncnn, The goal is to generate onnx turn ncnn
Command line tools for

```
git clone https://github.com/Tencent/ncnn.git  
cd ncnn  
git submodule update --init  
mkdir build  
cd build  
cmake ..  
make -j8  
make install  
Copy code
```

After compiling and installing , You can use onnx2ncnn The tool has transformed

```
cd tools/onnx  
./onnx2ncnn ~/Works/weights/best-sim.onnx  
~/Works/weights/model.param ~/Works/weights/model.bin  
Copy code
```

oh, no, Wrong report

```
xugaoliang@ubuntu:~/Works/ncnn/build/tools/onnx$ ./onnx2ncnn ~/Works/weights/  
best-sim.onnx ~/Works/weights/model.param ~/Works/weights/model.bin  
Unsupported slice step !  
Unsupported slice step !  
Unsupported slice step !  
Unsupported slice step !  
Unsupported slice step !  
Unsupported slice step !  
Unsupported slice step !  
Unsupported slice step !  
xugaoliang@ubuntu:~/Works/ncnn/build/tools/onnx$
```

This is because `slice` Not supported . To solve this problem , We need to edit the generated `param` file , Use the text tool to open it

```
7767517
201 228
Input          images          0 1 images
Split          splitncnn_input0 1 4 images images_splitncnn_0 images_splitncnn_1 images_splitncnn_2 images_splitncnn_3
Crop           Slice_4      1 1 images_splitncnn_3 171 -23309=1,0 -23310=1,2147483647 -23311=1,1
Crop           Slice_9      1 1 171 176 -23309=1,0 -23310=1,2147483647 -23311=1,2
Crop           Slice_14     1 1 images_splitncnn_2 181 -23309=1,1 -23310=1,2147483647 -23311=1,1
Crop           Slice_19     1 1 181 186 -23309=1,0 -23310=1,2147483647 -23311=1,2
Crop           Slice_24     1 1 images_splitncnn_1 191 -23309=1,0 -23310=1,2147483647 -23311=1,1
Crop           Slice_29     1 1 191 196 -23309=1,1 -23310=1,2147483647 -23311=1,2
Crop           Slice_34     1 1 images_splitncnn_0 201 -23309=1,1 -23310=1,2147483647 -23311=1,1
Crop           Slice_39     1 1 201 206 -23309=1,1 -23310=1,2147483647 -23311=1,2
Concat         Concat_40    4 1 176 186 196 206 207 0=0
Convolution    Conv_41      1 1 207 208 0=32 1=3 11=3 2=1 12=1 3=1 13=1 4=1 14=1 15=1 16=1 5=1 6=3456
ReLU          LeakyRelu_42 1 1 208 209 0=1.0000000e-01
Convolution    Conv_43      1 1 209 210 0=64 1=3 11=3 2=1 12=1 3=2 13=2 4=1 14=1 15=1 16=1 5=1 6=18432
ReLU          LeakyRelu_44 1 1 210 211 0=1.0000000e-01
```

The modified `param` That's true

```
1 7767517
2 192 228
3 Input          images          0 1 images
4 YoloV5Focus    focus          1 1 images 207
5 Convolution    Conv_41      1 1 207 208 0=32 1=3 11=3 2=1 12=1 3=1 13=1 4=1 14=1 15=1 16=1 5=1 6=3456
6 ReLU          LeakyRelu_42 1 1 208 209 0=1.0000000e-01
7 Convolution    Conv_43      1 1 209 210 0=64 1=3 11=3 2=1 12=1 3=2 13=2 4=1 14=1 15=1 16=1 5=1 6=18432
8 ReLU          LeakyRelu_44 1 1 210 211 0=1.0000000e-01
9 Split         splitncnn_0  1 2 211 211_splitncnn_0 211_splitncnn_1
10 Convolution   Conv_45      1 1 211_splitncnn_1 212 0=32 1=1 11=1 2=1 12=1 3=1 13=1 4=0 14=0 15=0 16=0 5=1 6=2048
11 ReLU          LeakyRelu_46 1 1 212 213 0=1.0000000e-01
```

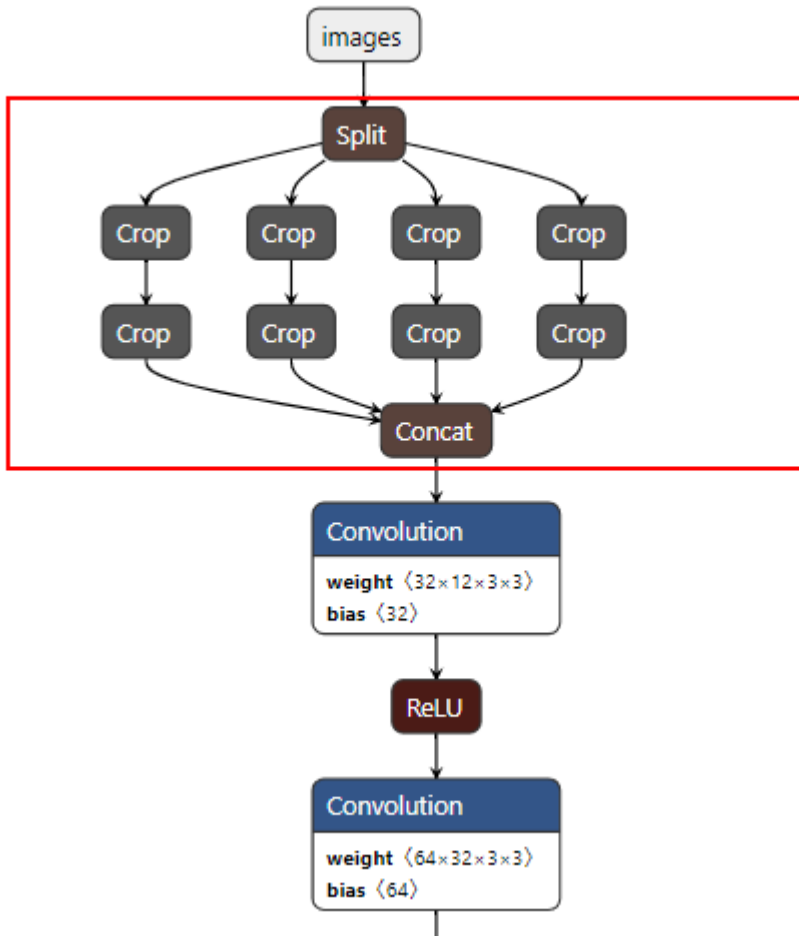
The first number in the second row is the number of layers , Because we deleted 8 individual `crop` and 1 individual `concat`, So its value is $201-9=192$

in addition , What needs to be modified is `Reshape` Layer output `grid`, Change the corresponding values to `-1`, This is to solve the problem of multiple detection frames in practice

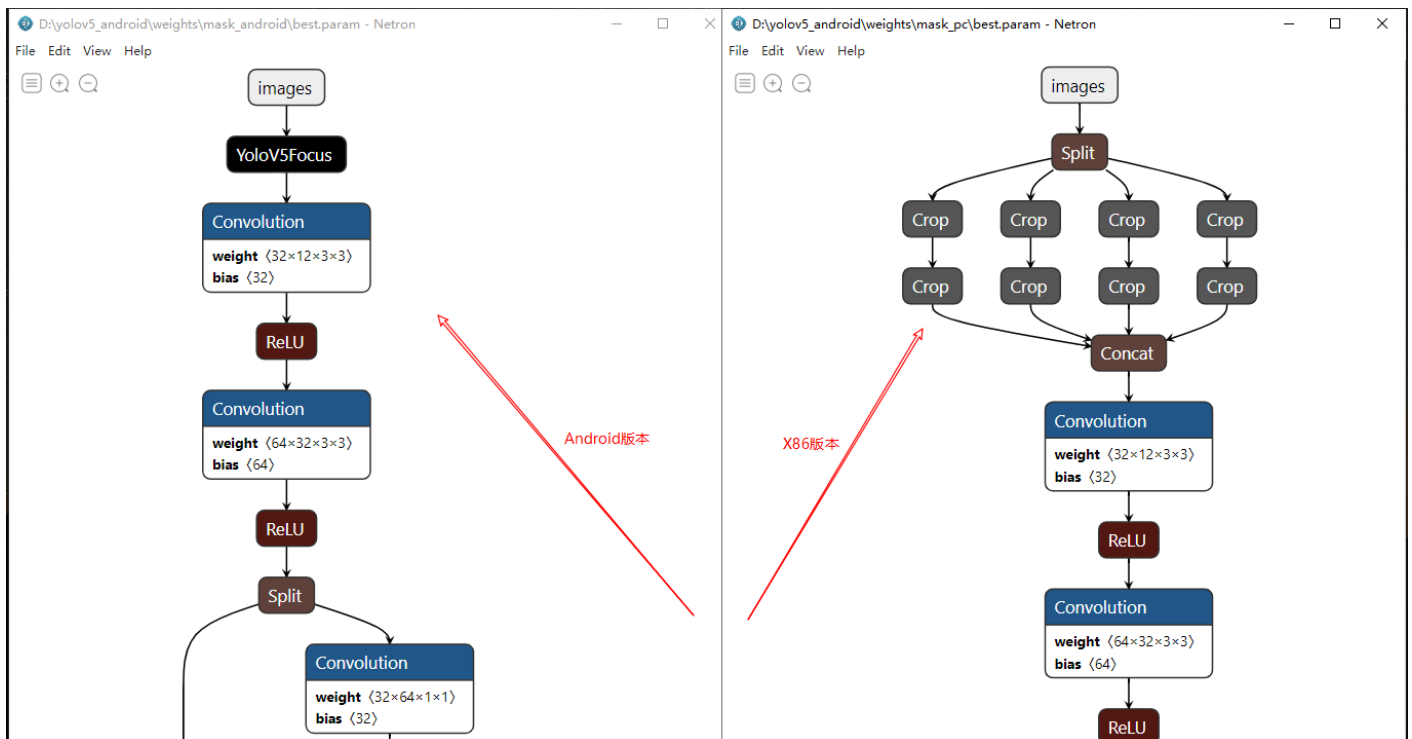
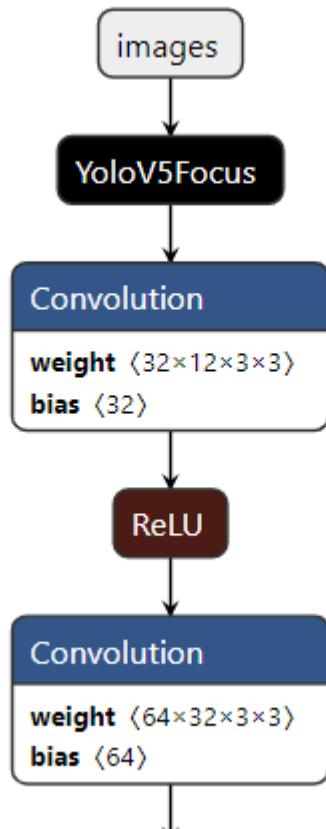
```
Reshape        Reshape_216    1 1 385 403 0=6400 1=7 2=3
Permute        Transpose_217  1 1 403 output 0=1
Convolution    Conv_218      1 1 368_splitncnn_0 405 0=21 1=1 11=1 2=1 12=1 3=1 13=1 4=0 14=0 15=0 16=0 5=1 6=5376
Reshape        Reshape_232    1 1 405 423 0=1600 1=7 2=3
Permute        Transpose_233  1 1 423 424 0=1
Convolution    Conv_234      1 1 384 425 0=21 1=1 11=1 2=1 12=1 3=1 13=1 4=0 14=0 15=0 16=0 5=1 6=10752
Reshape        Reshape_248    1 1 425 443 0=400 1=7 2=3
Permute        Transpose_249  1 1 443 444 0=1
```

```
Reshape        Reshape_216    1 1 385 403 0=-1 1=7 2=3
Permute        Transpose_217  1 1 403 output 0=1
Convolution    Conv_218      1 1 368_splitncnn_0 405 0=21 1=1 11=1 2=1 12=1 3=1 13=1 4=0 14=0 15=0 16=0 5=1 6=5376
Reshape        Reshape_232    1 1 405 423 0=-1 1=7 2=3
Permute        Transpose_233  1 1 423 424 0=1
Convolution    Conv_234      1 1 384 425 0=21 1=1 11=1 2=1 12=1 3=1 13=1 4=0 14=0 15=0 16=0 5=1 6=10752
Reshape        Reshape_248    1 1 425 443 0=-1 1=7 2=3
Permute        Transpose_249  1 1 443 444 0=1
```

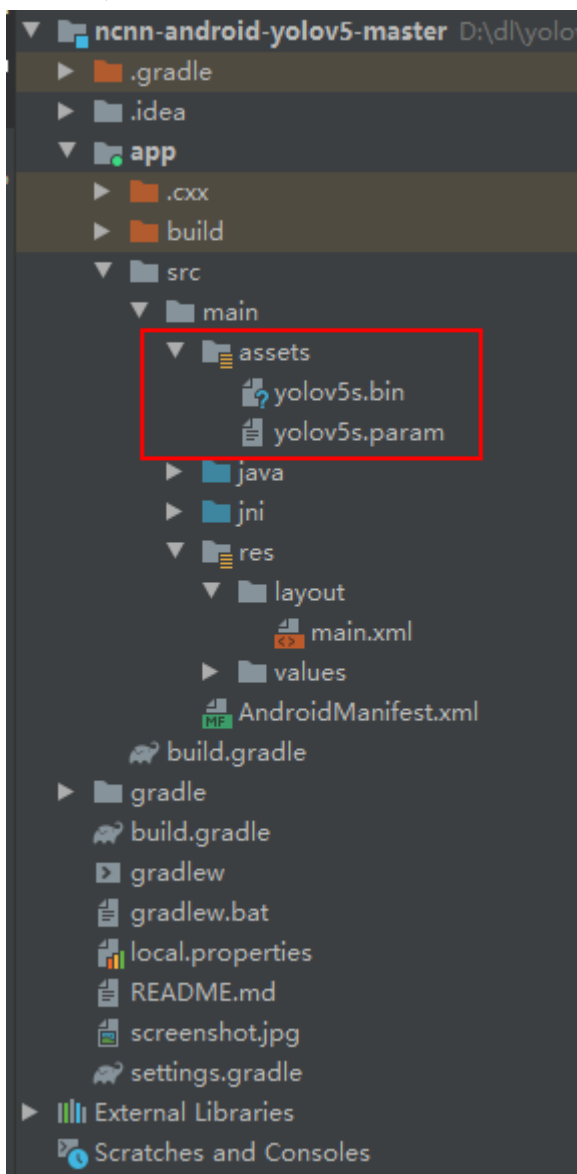
It can be used `netron` This tool opens to see the network structure ,windows、 linux、 macos both , Address [github.com/lutzroeder/...](https://github.com/lutzroeder/netron)



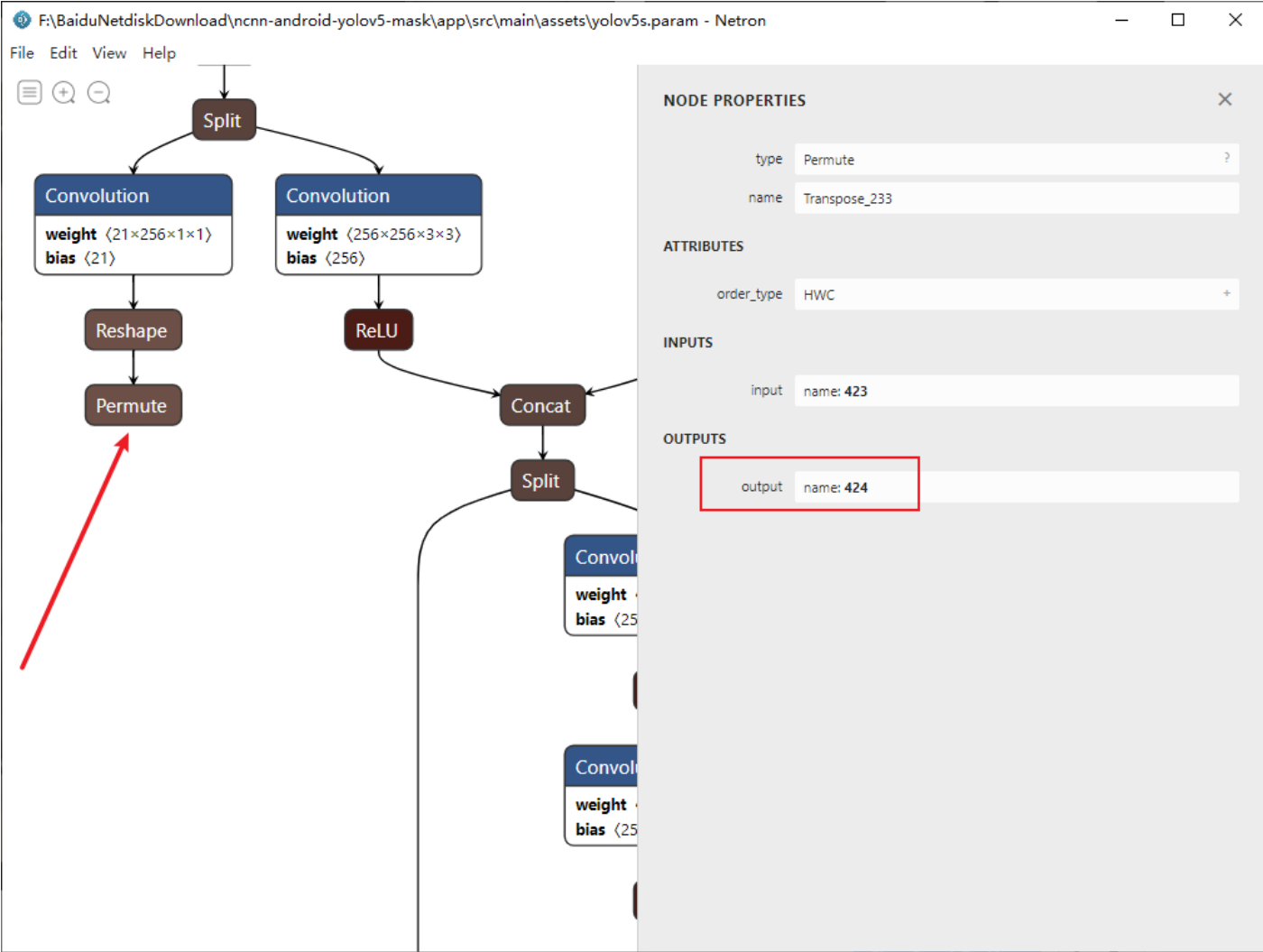
In the picture , We want to delete `split`、 `concat` and 8 individual `crop` node , And add new nodes `yolov5Focus`, The node name is `android` In the source `yolov5ncnn_jni.cpp` The class name in the . Here you can combine the text editor with `netron` To combine , Check immediately after modification .

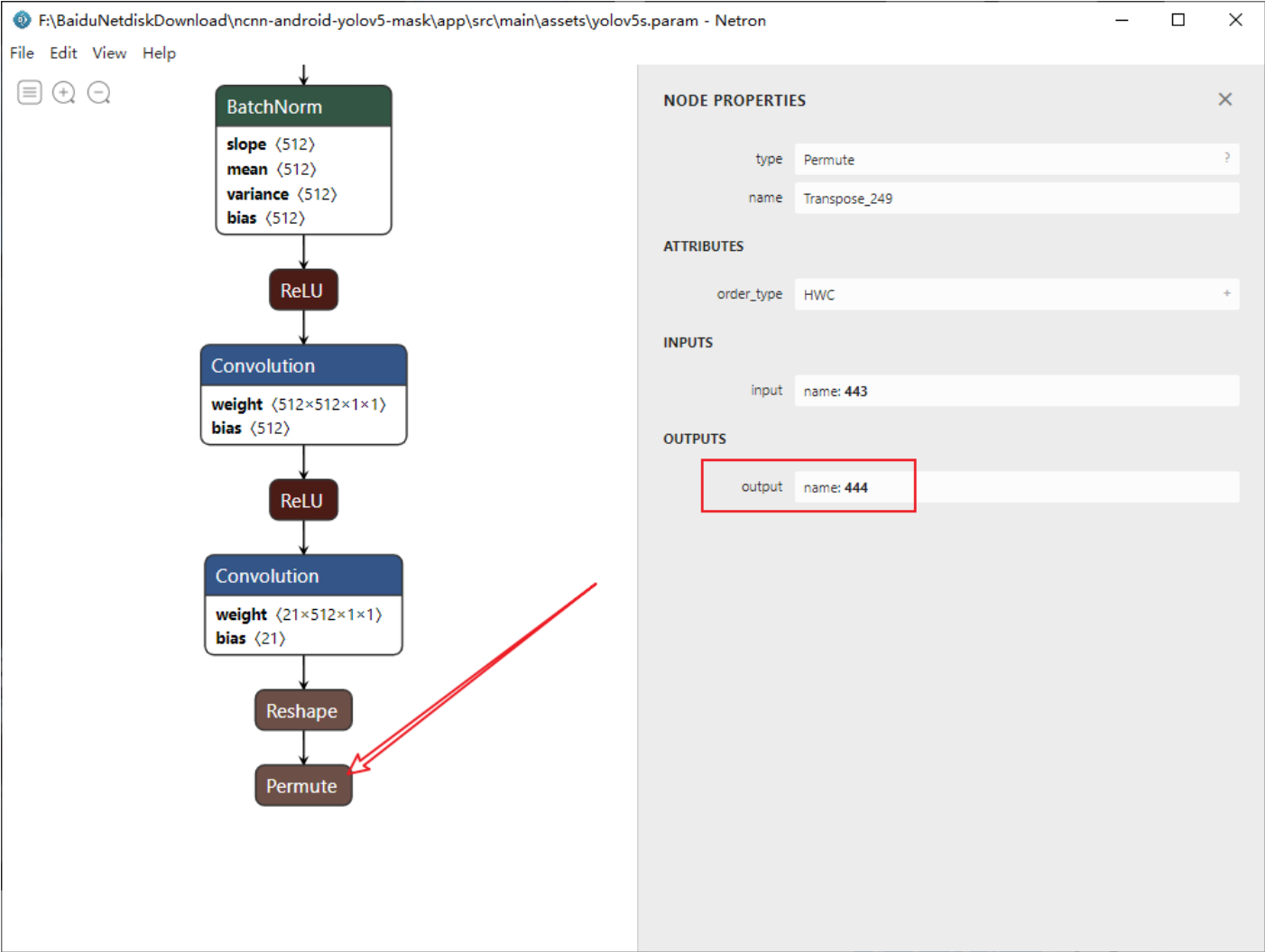


Then you can replace the original android In Engineering assets Under folder yolov5s.param and yolov5s.bin



And then modify the source file `yolov5ncnn_jni.cpp`, modify 2 individual Permute Node output





```

// stride 16
{
    ncnn::Mat out;
    ex.extract( blob_name: "424", &out);

    ncnn::Mat anchors( _w: 6);
    anchors[0] = 30.f;
    anchors[1] = 61.f;
    anchors[2] = 62.f;
    anchors[3] = 45.f;
    anchors[4] = 59.f;
    anchors[5] = 119.f;

    std::vector<Object> objects16;
    generate_proposals(anchors, stride: 16, in_pad, out, prob_threshold, &objects16);

    proposals.insert( position: proposals.end(), objects16.begin(), objects16.end());
}

// stride 32
{
    ncnn::Mat out;
    ex.extract( blob_name: "444", &out);

    ncnn::Mat anchors( _w: 6);
    anchors[0] = 116.f;
    anchors[1] = 90.f;
    anchors[2] = 156.f;
    anchors[3] = 198.f;
    anchors[4] = 373.f;

```

Last , modify class names

```

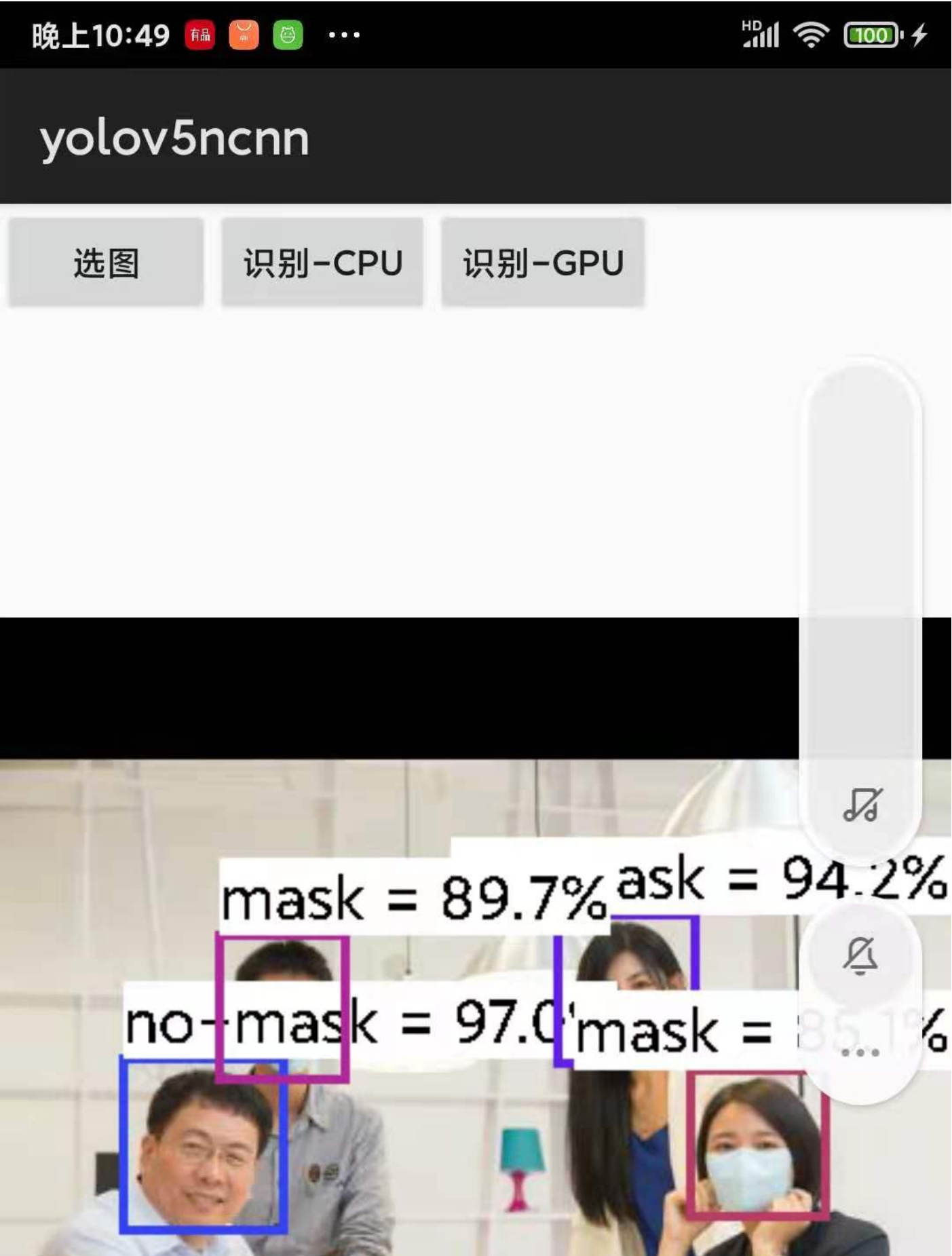
// objects to Obj[]
// static const char* class_names[] = {
//     "person", "bicycle", "car", "motorcycle", "airplane", "bus", "train", "truck", "boat", "traffic light",
//     "fire hydrant", "stop sign", "parking meter", "bench", "bird", "cat", "dog", "horse", "sheep", "cow",
//     "elephant", "bear", "zebra", "giraffe", "backpack", "umbrella", "handbag", "tie", "suitcase", "frisbee",
//     "skis", "snowboard", "sports ball", "kite", "baseball bat", "baseball glove", "skateboard", "surfboard",
//     "tennis racket", "bottle", "wine glass", "cup", "fork", "knife", "spoon", "bowl", "banana", "apple",
//     "sandwich", "orange", "broccoli", "carrot", "hot dog", "pizza", "donut", "cake", "chair", "couch",
//     "potted plant", "bed", "dining table", "toilet", "tv", "laptop", "mouse", "remote", "keyboard", "cell phone",
//     "microwave", "oven", "toaster", "sink", "refrigerator", "book", "clock", "vase", "scissors", "teddy bear",
//     "hair drier", "toothbrush"
// };

static const char* class_names[] = {
    "mask", "no-mask"
};

```

Recompile project , Connect your cell phone , install apk And run

The final results are as follows



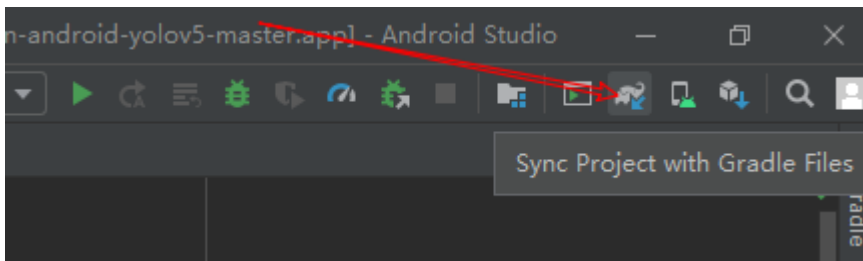


FAQ

Here are a few common questions , For your reference .

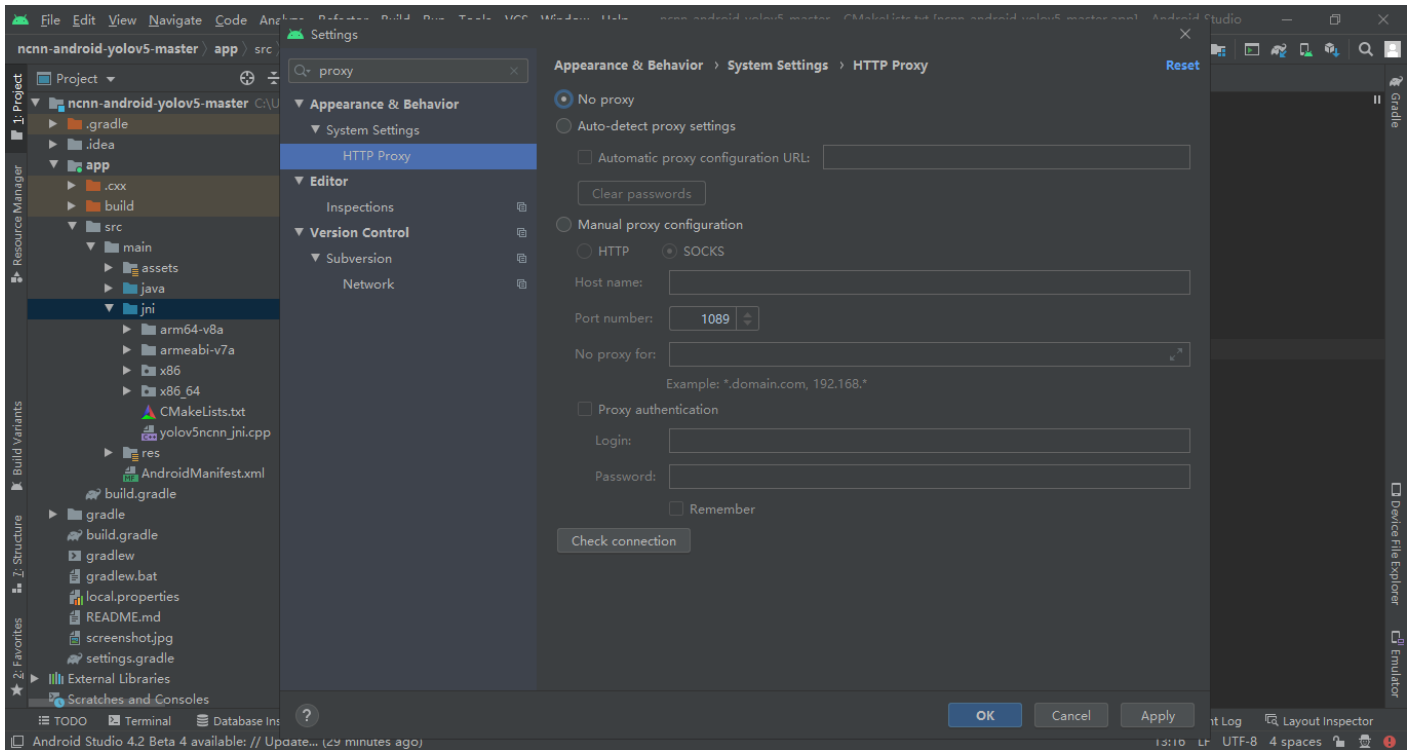
```
Could not install Gradle distribution from  
'https://services.gradle.org/distributions/gradle-5.4.1-all.zip'.  
Copy code
```

close android studio, Manually from the site [services.gradle.org/distributio...](https://services.gradle.org/distributions/gradle-5.4.1-all.zip) Download zip , Then go to the folder C:\Users\Administrator.gradle\wrapper\dists\gradle-5.4.1-all\3221gyoj15jsh0helicew7rwx, Delete all the original contents , Copy in the downloaded package , Open again android studio, Click on the sync Project with Gradle Files



Cause: jcenter.bintray.com:443 failed to respond
Copy code

This problem may be related to agency , stay File --> Settings --> HTTP Proxy, Close the agent



Or edit the file `~.gradle\gradle.properties`, take proxy Comment out the related statements


```

1  ## For more details on how to configure your build environment visit
2  # http://www.gradle.org/docs/current/userguide/build\_environment.html
3  #
4  # Specifies the JVM arguments used for the daemon process.
5  # The setting is particularly useful for tweaking memory settings.
6  # Default value: -Xmx1024m -XX:MaxPermSize=256m
7  # org.gradle.jvmargs=-Xmx2048m -XX:MaxPermSize=512m -XX:+HeapDumpOnOutOfMemoryError -Dfile.encoding=UTF-8
8  #
9  # When configured, Gradle will run in incubating parallel mode.
10 # This option should only be used with decoupled projects. More details, visit
11 # http://www.gradle.org/docs/current/userguide/multi\_project\_builds.html#sec:decoupled\_projects
12 # org.gradle.parallel=true
13 #Thu Jan 28 14:32:44 CST 2021
14 #systemProp.http.proxyHost=127.0.0.1
15 #systemProp.http.proxyPort=1089
16 #systemProp.https.proxyHost=127.0.0.1
17 #systemProp.https.proxyPort=1089
18

```

Another mistake , Is compiled ncnn When , appear tiff Related error messages

```

//usr/lib/libgdal.so.20: undefined reference to `TIFFErrorExt@LIBTIFF_4.0'
//usr/lib/libgdal.so.20: undefined reference to `TIFFGetFieldDefaulted@LIBTIFF_4.0'
//usr/lib/libgdal.so.20: undefined reference to `TIFFSwabArrayOfLong@LIBTIFF_4.0'
//usr/lib/libgdal.so.20: undefined reference to `TIFFNumberOfDirectories@LIBTIFF_4.0'
//usr/lib/libgdal.so.20: undefined reference to `TIFFTileSize64@LIBTIFF_4.0'
//usr/lib/libgdal.so.20: undefined reference to `TIFFWriteRawTile@LIBTIFF_4.0'
//usr/lib/libgdal.so.20: undefined reference to `TIFFStripSize64@LIBTIFF_4.0'
//usr/lib/x86_64-linux-gnu/libopencv_imgcodecs.so.3.2.0: undefined reference to `TIFFOpen@LIBTIFF_4.0'
//usr/lib/libgdal.so.20: undefined reference to `TIFFCreateDirectory@LIBTIFF_4.0'
//usr/lib/libgdal.so.20: undefined reference to `TIFFSetSubDirectory@LIBTIFF_4.0'
//usr/lib/libgdal.so.20: undefined reference to `TIFFStripSize@LIBTIFF_4.0'
//usr/lib/libgdal.so.20: undefined reference to `TIFFSwabArrayOfDouble@LIBTIFF_4.0'
//usr/lib/libgdal.so.20: undefined reference to `TIFFReadRGBATileExt@LIBTIFF_4.0'
//usr/lib/x86_64-linux-gnu/libopencv_imgcodecs.so.3.2.0: undefined reference to `TIFFReadEncodedStrip@LIBTIFF_4.0'
//usr/lib/libgdal.so.20: undefined reference to `TIFFUnlinkDirectory@LIBTIFF_4.0'
//usr/lib/libgdal.so.20: undefined reference to `TIFFUnsetField@LIBTIFF_4.0'
//usr/lib/x86_64-linux-gnu/libopencv_imgcodecs.so.3.2.0: undefined reference to `TIFFSetField@LIBTIFF_4.0'
//usr/lib/libgdal.so.20: undefined reference to `TIFFMergeFieldInfo@LIBTIFF_4.0'
//usr/lib/libgdal.so.20: undefined reference to `TIFFCurrentDirOffset@LIBTIFF_4.0'
//usr/lib/libgdal.so.20: undefined reference to `TIFFIsCODECConfigured@LIBTIFF_4.0'
//usr/lib/libgdal.so.20: undefined reference to `TIFFDataWidth@LIBTIFF_4.0'
//usr/lib/x86_64-linux-gnu/libopencv_imgcodecs.so.3.2.0: undefined reference to `TIFFSetWarningHandler@LIBTIFF_4.0'
//usr/lib/libgdal.so.20: undefined reference to `TIFFGetConfiguredCODECs@LIBTIFF_4.0'
//usr/lib/x86_64-linux-gnu/libgdcmSFF.so.2.8: undefined reference to `uuid_unparseUUID_1.0'
//usr/lib/x86_64-linux-gnu/libopencv_imgcodecs.so.3.2.0: undefined reference to `TIFFSetErrorHandler@LIBTIFF_4.0'
//usr/lib/libgdal.so.20: undefined reference to `TIFFGetSizeProc@LIBTIFF_4.0'
//usr/lib/libgdal.so.20: undefined reference to `TIFFRewriteDirectory@LIBTIFF_4.0'
//usr/lib/x86_64-linux-gnu/libgeotiff.so.2: undefined reference to `_TIFFmalloc@LIBTIFF_4.0'
//usr/lib/libgdal.so.20: undefined reference to `TIFFSetDirectory@LIBTIFF_4.0'
//usr/lib/libgdal.so.20: undefined reference to `TIFFReadScanline@LIBTIFF_4.0'
//usr/lib/libgdal.so.20: undefined reference to `TIFFNumberOfTiles@LIBTIFF_4.0'
collect2: error: ld returned 1 exit status
examples/CMakeFiles/retinaface.dir/build.make:110: recipe for target 'examples/retinaface' failed
make[2]: *** [examples/retinaface] Error 1
CMakeFiles/Makefile2:696: recipe for target 'examples/CMakeFiles/retinaface.dir/all' failed
make[1]: *** [examples/CMakeFiles/retinaface.dir/all] Error 2
Makefile:148: recipe for target 'all' failed
make: *** [all] Error 2

```

This is mainly anaconda Our environment leads to , My approach is to withdraw completely anaconda Environmental Science

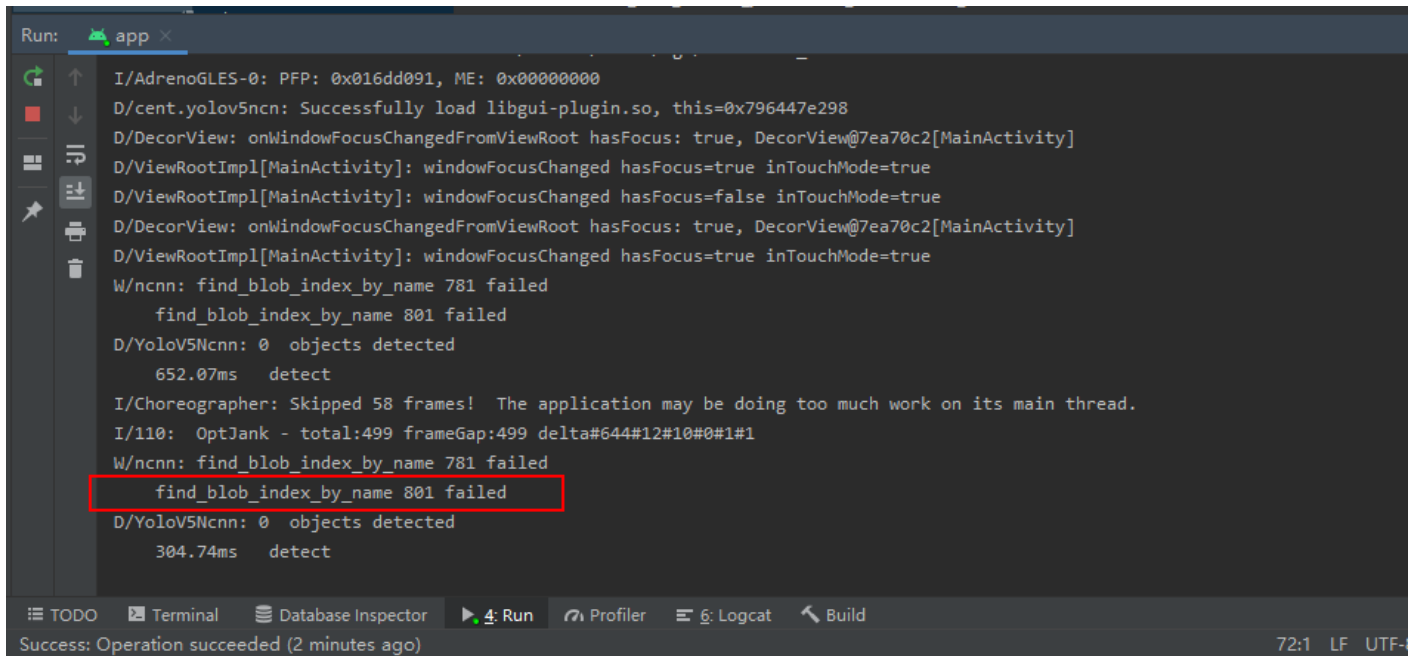
```

conda deactivate
unset LD_LIBRARY_PATH

```

[Copy code](#)

Last question , A common mistake in model transformation



```
Run: app x
I/AdrenoGLES-0: PFP: 0x016dd091, ME: 0x00000000
D/cent.yolov5ncnn: Successfully load libgui-plugin.so, this=0x796447e298
D/DecorView: onWindowFocusChangedFromViewRoot hasFocus: true, DecorView@7ea70c2[MainActivity]
D/ViewRootImpl[MainActivity]: windowFocusChanged hasFocus=true inTouchMode=true
D/ViewRootImpl[MainActivity]: windowFocusChanged hasFocus=false inTouchMode=true
D/DecorView: onWindowFocusChangedFromViewRoot hasFocus: true, DecorView@7ea70c2[MainActivity]
D/ViewRootImpl[MainActivity]: windowFocusChanged hasFocus=true inTouchMode=true
W/ncnn: find_blob_index_by_name 781 failed
      find_blob_index_by_name 801 failed
D/YoloV5Ncnn: 0 objects detected
      652.07ms detect
I/Choreographer: Skipped 58 frames! The application may be doing too much work on its main thread.
I/110: OptJank - total:499 frameGap:499 delta#644#12#10#0#1#1
W/ncnn: find_blob_index_by_name 781 failed
      find_blob_index_by_name 801 failed
D/YoloV5Ncnn: 0 objects detected
      304.74ms detect
```

The mistake is yolov5ncnn_jni.cpp Medium output Not matching the actual model

Source download

Baidu network disk link : pan.baidu.com/s/1U4XfNSeM... Extraction code : x8oi

Reference material

- [official github](#)
- [4.0 What's new ?](#)
- [How to train models](#)
- [ncnn](#)
- [Model training Visualization](#)
- [Android studio gradle Solutions to build failures](#)
- [github.com/daquexian/o...](#)

- [github.com/protocolbuf...](https://github.com/protocolbuf/protocolbuf)
- [github.com/Tencent/ncn...](https://github.com/Tencent/ncnn)

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