

多媒体之人脸识别应用

何畔龙

 ByteDance 字节跳动



课程内容

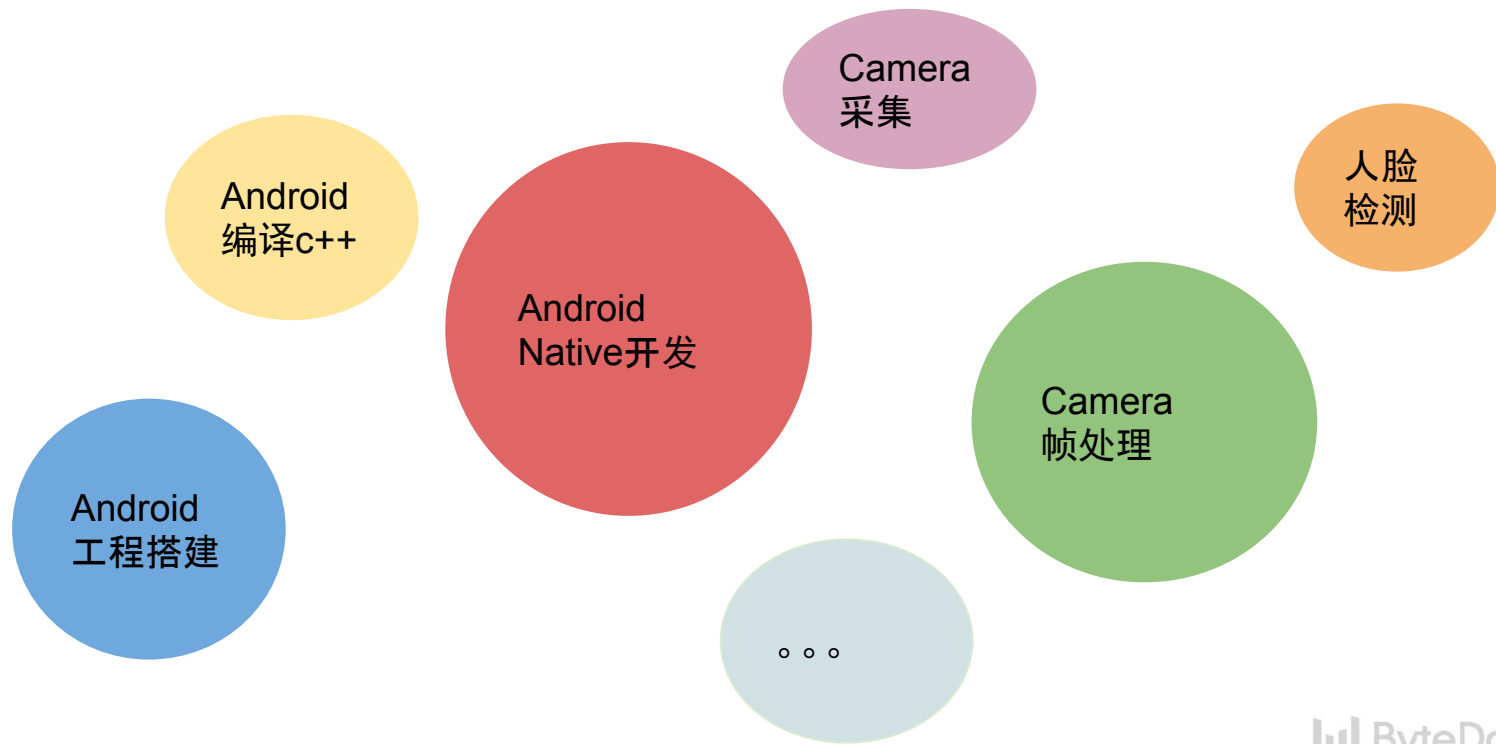
- ❑ 安装体验demo
- ❑ 知识点梳理
- ❑ Camera采集流程
- ❑ 认识Camera数据
- ❑ 认识Android的Native编程
- ❑ Android的Native开发工程搭建
- ❑ 功能实现



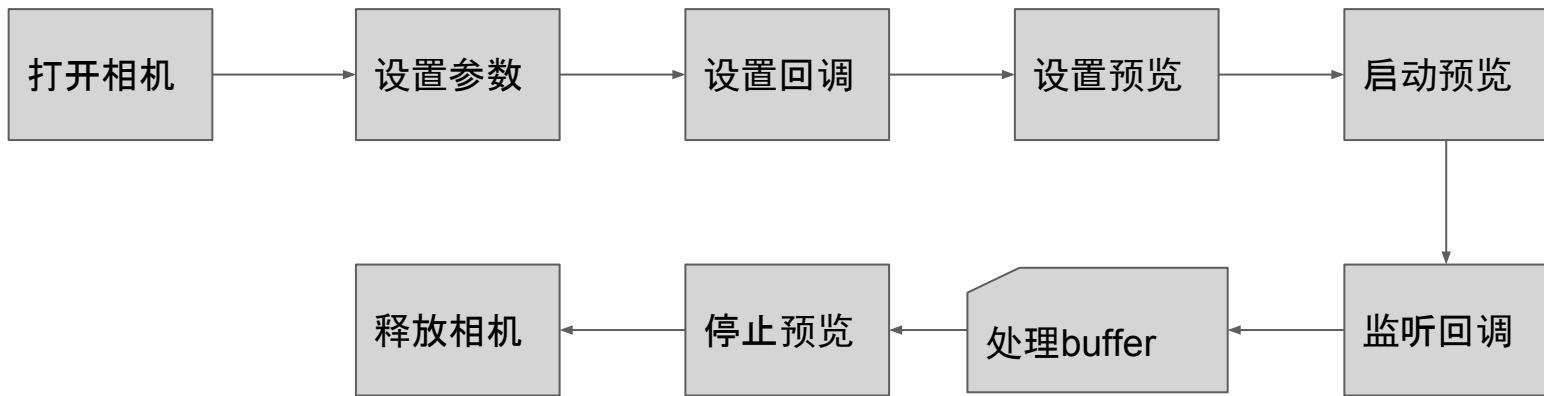
安装体验Demo

下载apk

知识点梳理

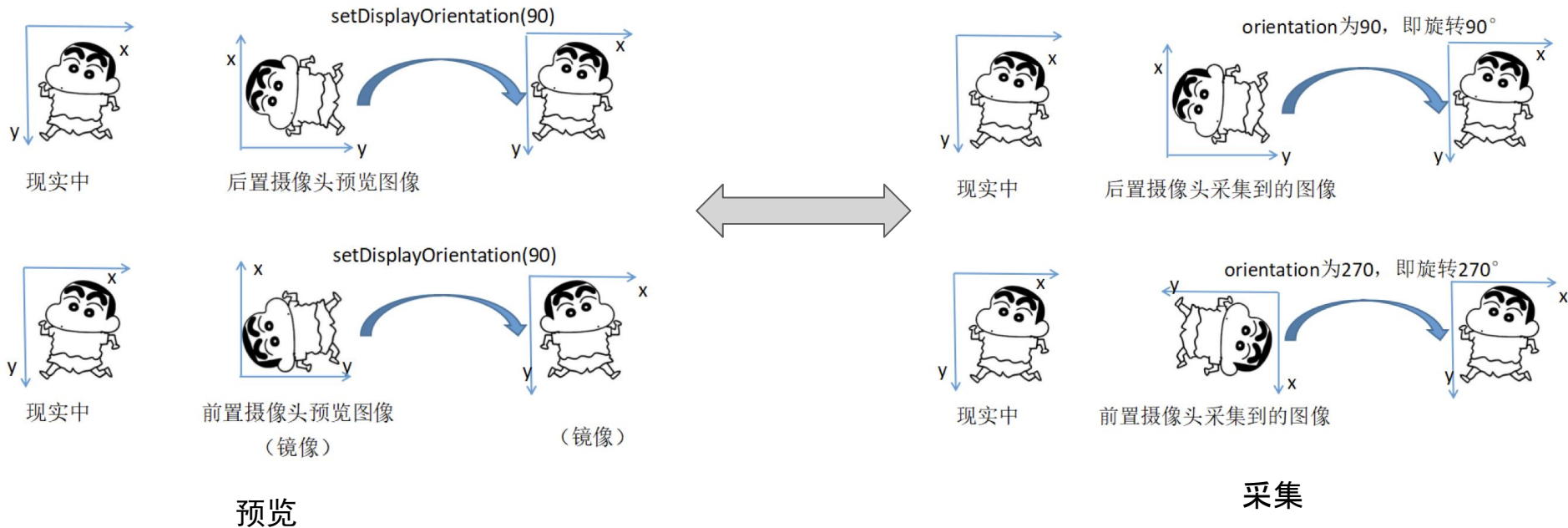


Camera采集流程



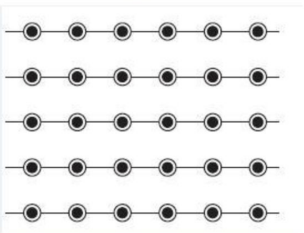
针对buffer采集

Camera采集流程



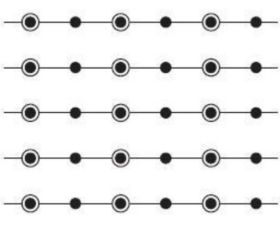
Camera采集流程

YUV4:4:4采样



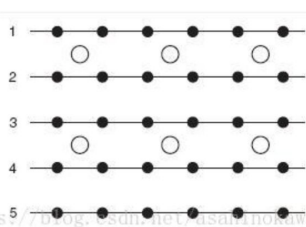
每一个Y对应一组UV分量

YUV4:2:2采样



每两个Y对应一组UV分量

YUV4:2:0采样



每四个Y对应一组UV分量

YUV Formats分成两个格式:

紧缩格式(packed formats):将Y、U、V值储存成Macro Pixels 阵列, 和RGB的存放方式类似。

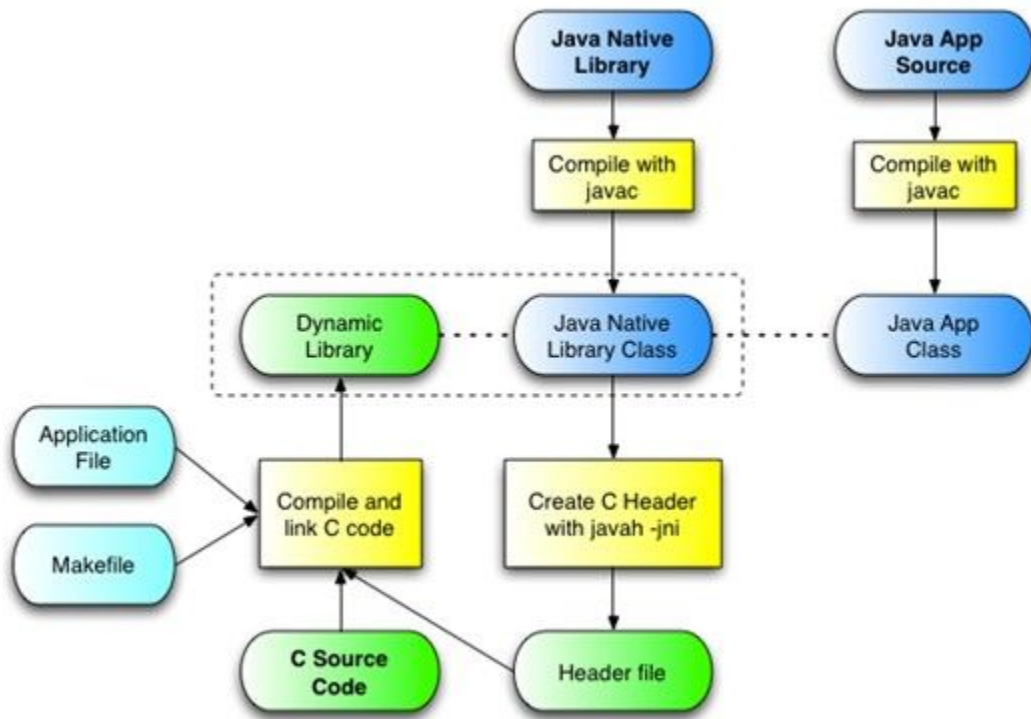
平面格式(planar formats):将Y、U、V的三个分量分别存放在不同的矩阵中。

Packed Formats:YUV422 (YUVY/UYVY)

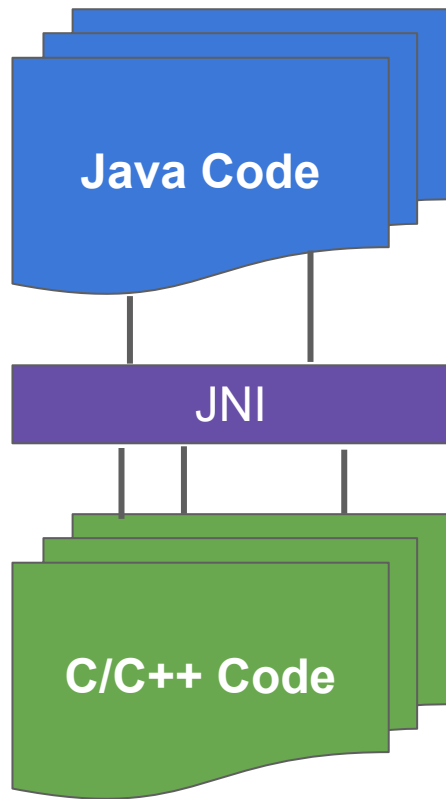
Planar Formats:YUV422 (YUV422P)、YUV420 (YV12/YU12/NV12/NV21)



Android Native编程 - 整体架构



Android Native编程 - JNI



Android Native编程 - CMake

```
#添加一个外部动态库
add_library( libeffect
    SHARED
    IMPORTED )
set_target_properties( # Specifies the target library.
    libeffect
    # Specifies the parameter you want to define.
    PROPERTIES IMPORTED_LOCATION
    # Provides the path to the library you want to import.
    "${CMAKE_SOURCE_DIR}/libs/armeabi-v7a/libeffect.so")
```

```
#添加一个外部动态库
add_library( libyuv
    STATIC
    IMPORTED )
set_target_properties( # Specifies the target library.
    libyuv
    # Specifies the parameter you want to define.
    PROPERTIES IMPORTED_LOCATION
    # Provides the path to the library you want to import.
    "${CMAKE_SOURCE_DIR}/libs/armeabi-v7a/libyuv.a")
```

```
#添加一个内部动态库
add_library( # Sets the name of the library.
    native-lib
    # Sets the library as a shared library.
    SHARED
    # Provides a relative path to your source file(s).
    src/main/cpp/native-lib.cpp
    src/main/cpp/TEUtils.cpp
    src/main/cpp/facedetect/FaceDetectHelper.cpp)
```

```
#头文件
include_directories(
    ${CMAKE_SOURCE_DIR}/src/main/cpp/include
    ${CMAKE_SOURCE_DIR}/src/main/cpp/include/libyuv
    ${CMAKE_SOURCE_DIR}/src/main/cpp/facedetect
)
```

```
#连接到自己要生成的动态库
target_link_libraries( # Specifies the target
    library.
    native-lib
    # Links the target library to the log
    library
    # included in the NDK.
    libyuv libeffect ${log-lib})
```

Android Native编程 - 工程搭建

Default Settings

Appearance & Behavior > System Settings > Android SDK

Manager for the Android SDK and Tools used by Android Studio

Android SDK Location: D:\Android\sdk [Edit](#)

SDK Platforms SDK Tools SDK Update Sites

Below are the available SDK developer tools. Once installed, Android Studio will automatically check for updates. Check "show package details" to display available versions of an SDK Tool.

Name	Version	Status
<input type="checkbox"/> Android SDK Build-Tools		Update Available: 27.0.2
<input type="checkbox"/> GPU Debugging tools		Not Installed
<input checked="" type="checkbox"/> CMake		Installed
<input checked="" type="checkbox"/> LLDB		Installed
<input type="checkbox"/> Android Auto API Simulators	1	Not installed
<input type="checkbox"/> Android Auto Desktop Head Unit emulator	1.1	Not installed
<input checked="" type="checkbox"/> Android Emulator	27.0.2	Installed
<input checked="" type="checkbox"/> Android SDK Platform-Tools	27.0.0	Installed
<input checked="" type="checkbox"/> Android SDK Tools	26.1.1	Installed
<input checked="" type="checkbox"/> Documentation for Android SDK	1	Installed
<input type="checkbox"/> Google Play APK Expansion library	1	Not installed
<input type="checkbox"/> Google Play Licensing Library	1	Not installed
<input type="checkbox"/> Google Play services	46	Not installed
<input type="checkbox"/> Google USB Driver	11	Not installed
<input type="checkbox"/> Google Web Driver	2	Not installed
<input type="checkbox"/> Instant Apps Development SDK	1.1.0	Not installed
<input checked="" type="checkbox"/> Intel x86 Emulator Accelerator (HAXM installer)	6.2.1	Installed
<input checked="" type="checkbox"/> NDK	16.1.4479499	Installed
<input checked="" type="checkbox"/> Support Repository		
<input checked="" type="checkbox"/> ConstraintLayout for Android		Installed
<input checked="" type="checkbox"/> Solver for ConstraintLayout		Installed
<input checked="" type="checkbox"/> Android Support Repository	47.0.0	Installed
<input checked="" type="checkbox"/> Google Repository	58	Installed

<http://csdn.net/quwei3930921>

Android Native编程 - 工程搭建

Application name
JniTest

Company domain
test.com

Project location
E:\work2\JniTest

Package name
com.test.jnittest Edit

☒ **Include C++ support**

☐ **Include Kotlin support**

<http://blog.csdn.net/quwei3930921>

注意观察:

- 1、CMakeList.txt
- 2、build.gradle

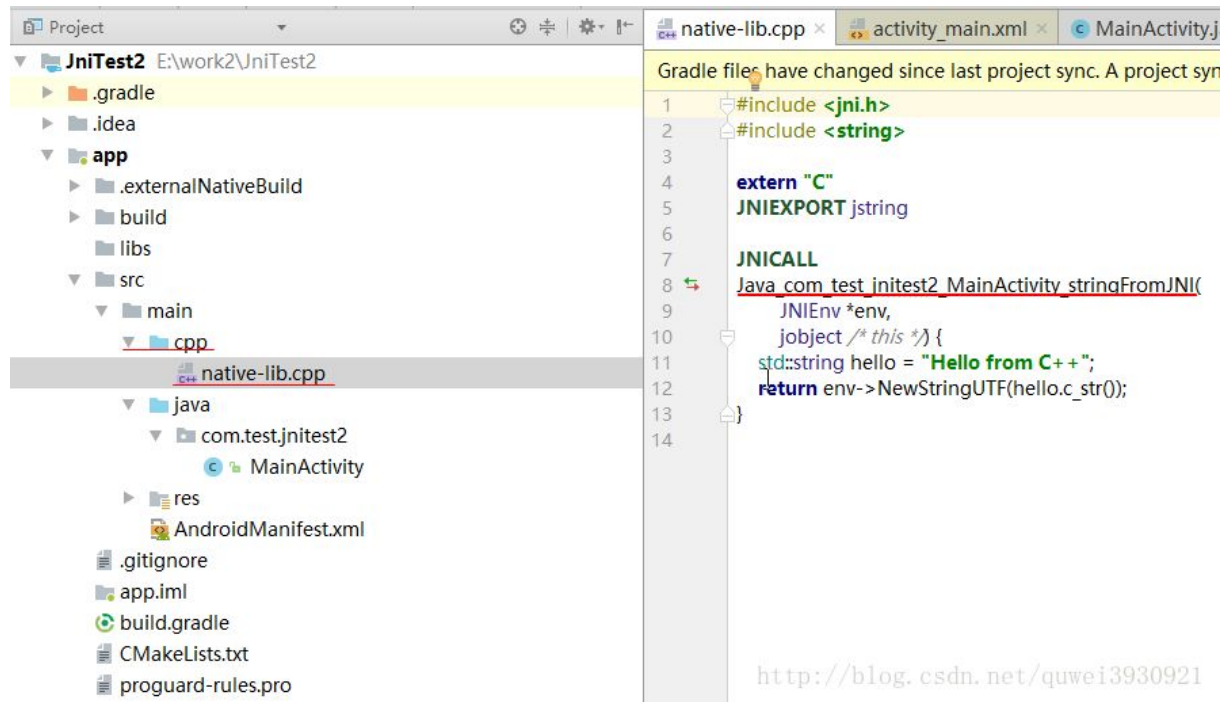
Android Native编程 - 工程搭建

```
android {
    compileSdkVersion 28
    defaultConfig {
        applicationId "com.bytedance.ies.camerarerecorddemoapp"
        minSdkVersion 18
        targetSdkVersion 28
        versionCode 1
        versionName "1.0"
        testInstrumentationRunner "android.support.test.runner.AndroidJUnitRunner"

        sourceSets {
            main {
                jniLibs.srcDirs = ['libs']
            }
        }

        externalNativeBuild {
            cmake {
                cppFlags ""
            }
        }
    }
    ndk {
        abiFilters 'armeabi-v7a'
    }
    buildTypes {
        release {
            minifyEnabled false
            proguardFiles getDefaultProguardFile('proguard-android.txt'), 'proguard-rules.pro'
        }
    }
    externalNativeBuild {
        cmake {
            path "CMakeLists.txt"
        }
    }
}
```

Android Native编程 - 工程搭建



自己新建一个工程运行起来



THANKS



ByteDance 字节跳动