OpenGl应用

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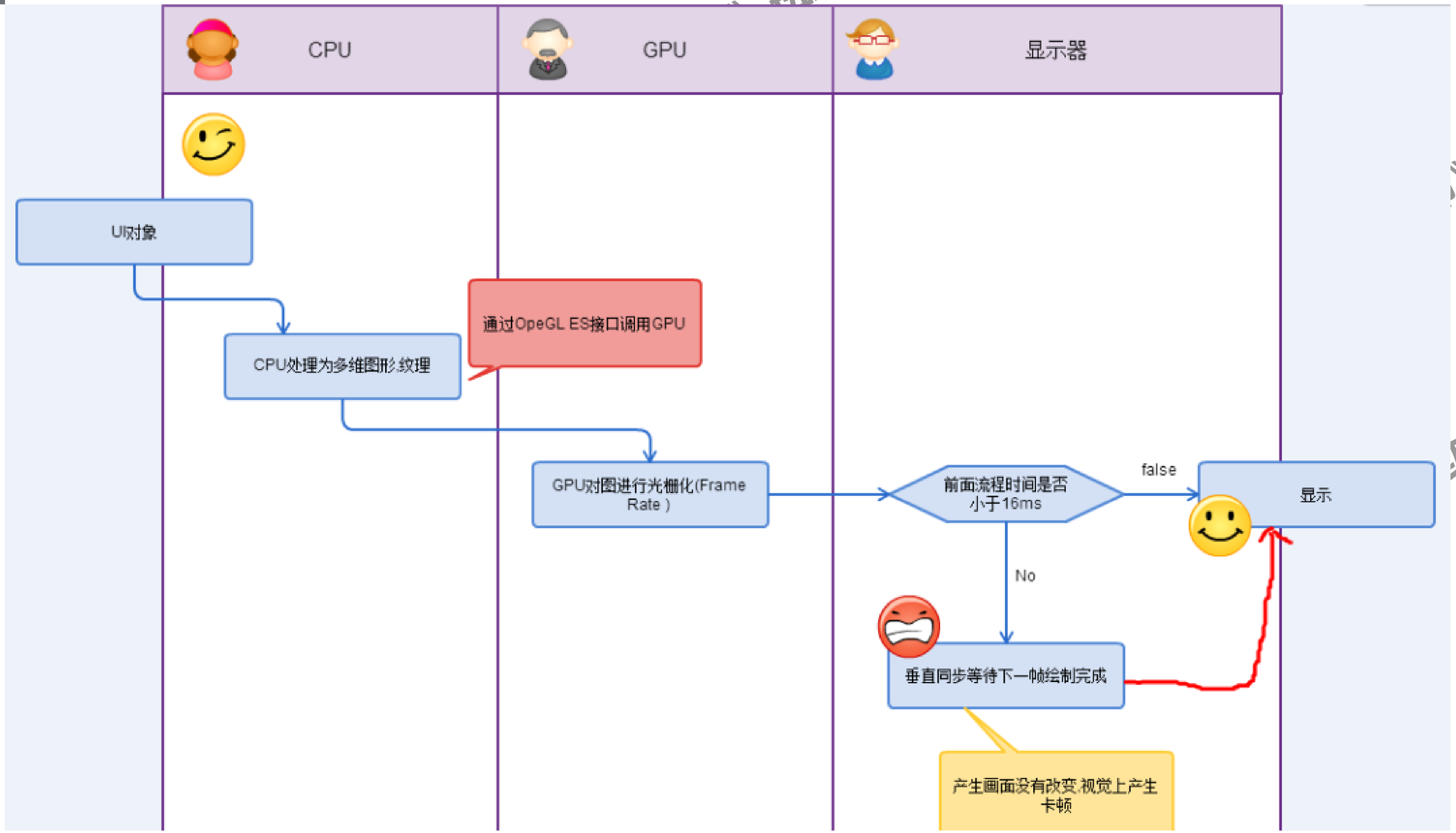
Android渲染机制分析



—-> UI对象

—->CPU处理为纹理 纹理

—->通过OpeGL ES接口调用GPU

—->GPU对图进行光栅化

—->硬件时钟(Refresh Rate)

—->垂直同步

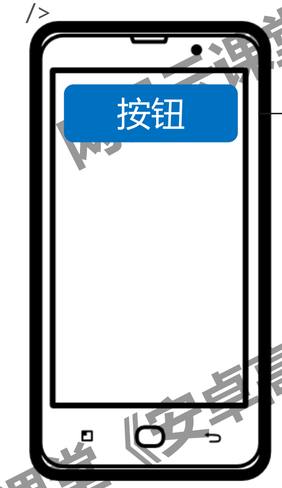
—->投射到屏幕

班级资料

Android绘制原理

```
<Button
    android:layout_width="match_parent"

android:layout_height="match_parent"
    android:text="按钮"
    />
```



LayoutInfalte
r

Button对象

对象含有left top
Right
bottom,width
height信息

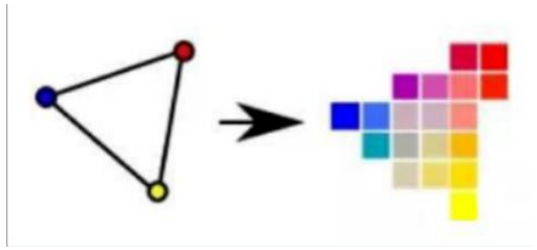
CPU计算

处理成多为的向量图形

将向量图像交给GPU
GPU负责填充

栅格化

Rasterization



定义: 栅格化是将响亮图形格式表示的图像转换成像素位图图像用以显示在显示器中

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如何学习底层直接调用Android服务

- 地址 https://github.com/googlesamples/android-ndk

Android NDK samples with Android Studio http://developer.android.com/ndk

1,289 commits | 5 branches | 0 releases | 48 contributors | Apache-2.0

Branch: master | New pull request | Find File | Clone or download

ggfan added more instruction to build native-midi with studio (#630) — Latest commit 86ceeb2 on 15 Mar

.ci_tools	CI script update: no need to install with constraintLayout 1.0.2+ (#618)	4 months ago
audio-echo	Update build script to version 3.3.1 (#622)	4 months ago
bitmap-plasma	Update build script to version 3.3.1 (#622)	4 months ago
builder	Update build script to version 3.3.1 (#622)	4 months ago
camera	Update build script to version 3.3.1 (#622)	4 months ago
display-p3	Update build script to version 3.3.1 (#622)	4 months ago
endless-tunnel	Update build script to version 3.3.1 (#622)	4 months ago
gles3jni	Update build script to version 3.3.1 (#622)	4 months ago
hello-cdep	Update build script to version 3.3.1 (#622)	4 months ago
hello-gl2	Update build script to version 3.3.1 (#622)	4 months ago
hello-jni	Update build script to version 3.3.1 (#622)	4 months ago
hello-jniCallback	Update build script to version 3.3.1 (#622)	4 months ago
hello-libs	Update build script to version 3.3.1 (#622)	4 months ago
hello-neon	Update build script to version 3.3.1 (#622)	4 months ago
kotlin-app	Update build script to version 3.3.1 (#622)	4 months ago
native-activity	Update build script to version 3.3.1 (#622)	4 months ago
native-audio	Update build script to version 3.3.1 (#622)	4 months ago
native-codec	Update build script to version 3.3.1 (#622)	4 months ago
native-media	Update build script to version 3.3.1 (#622)	4 months ago
native-midi	added more instruction to build native-midi with studio (#630)	3 months ago
native-plasma	Update build script to version 3.3.1 (#622)	4 months ago
nn_sample	Update build script to version 3.3.1 (#622)	4 months ago
other-builds	Update build script to version 3.3.1 (#622)	4 months ago
san-angeles	Update build script to version 3.3.1 (#622)	4 months ago
sensor-graph	Update build script to version 3.3.1 (#622)	4 months ago

- Camera 底层操作相机
- bitmap-plasma 底层直接渲染Bitmap
- native-activity native层操作Activity
- native-audio native层播放音频
- native-media native层控制多媒体
- native-plasma Bitmap中细胞质效果
- nn_sample Android中网络库
- sensor-graph native层获取地图经纬度
- Webp native层加载和渲染webp

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使用OpenSL ES流程图

01 创建音频引擎

02 设置混音器

03 创建播放器（录音器）

04 设置缓冲队列和回调函数

05 设置播放状态

06 启动回调函数

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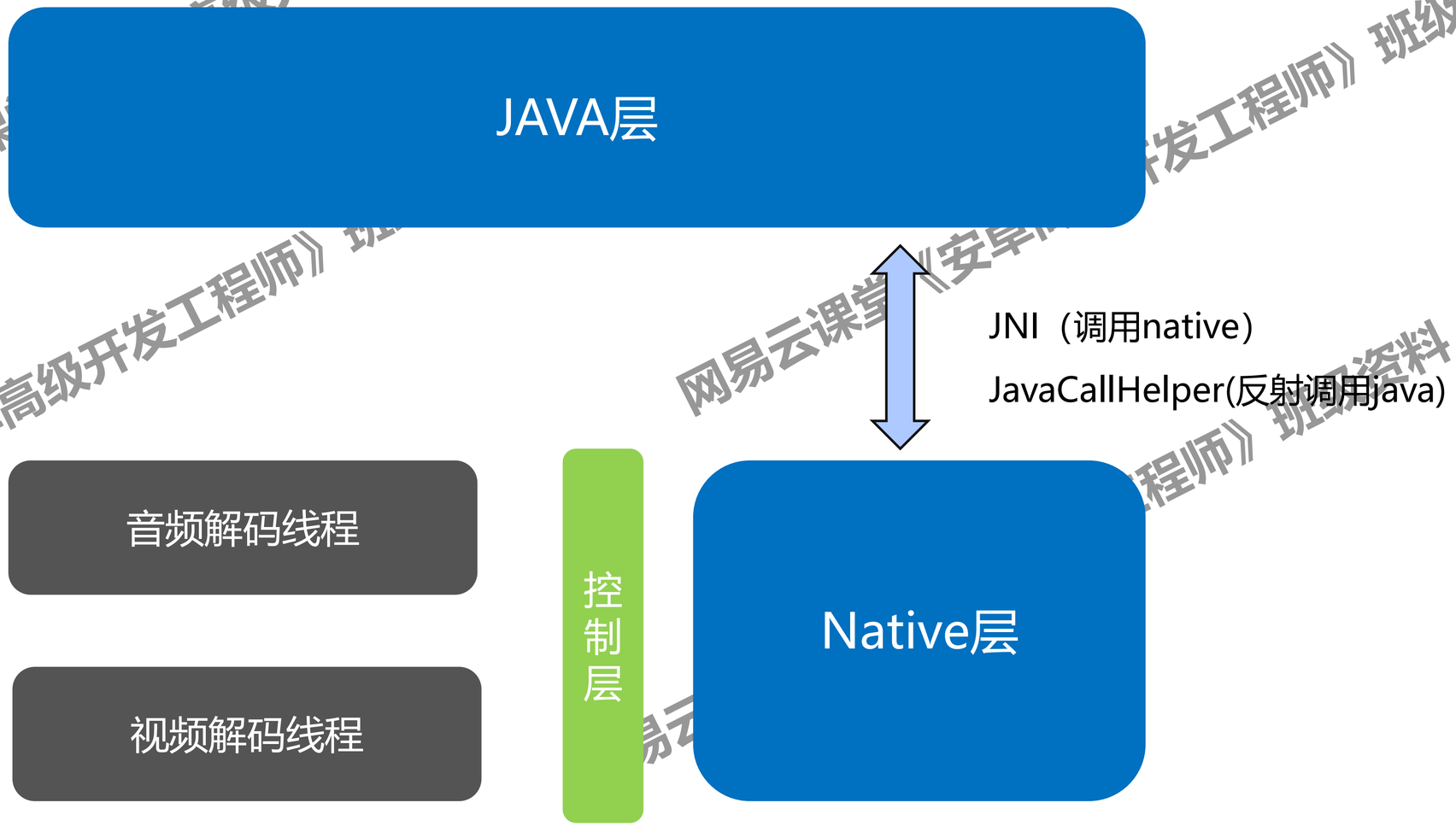
云信课堂项目框架



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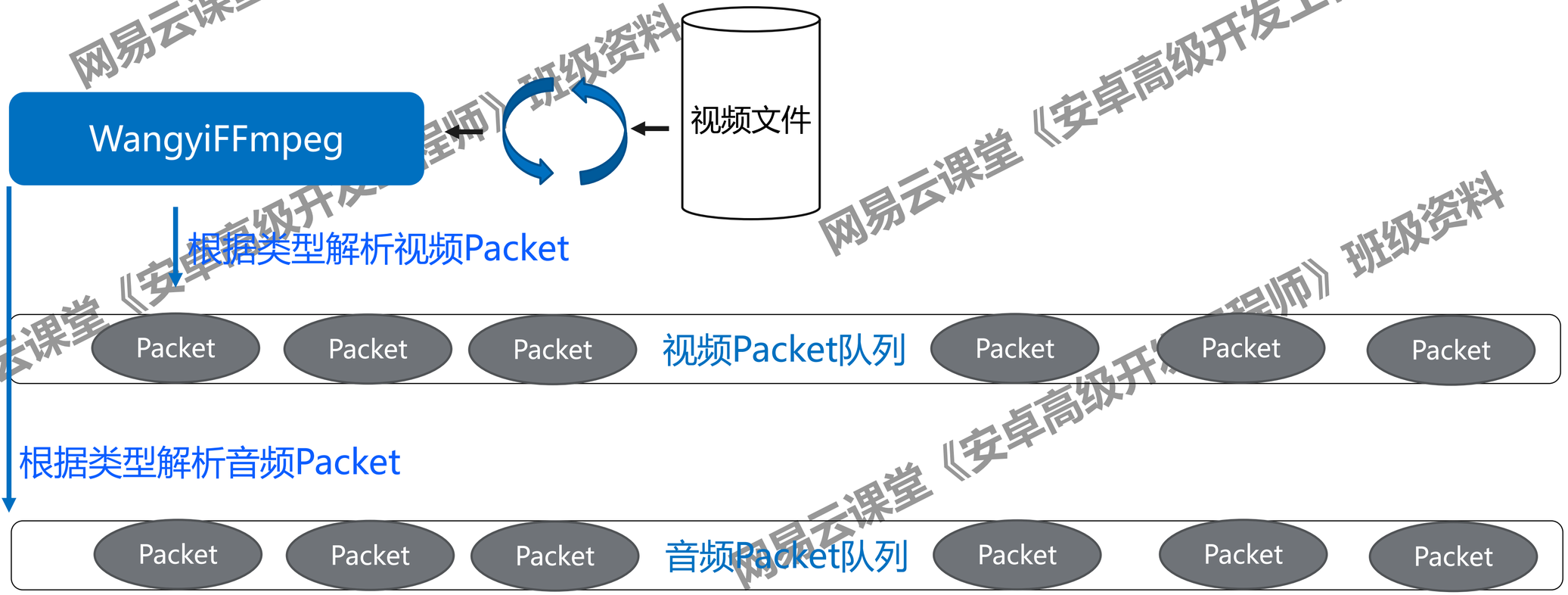
控制层

作用: 初始化FFmpeg参数设置

控制进度播放(开始播放,暂定，调节播放)

从视频文件(视频流)解析Packet



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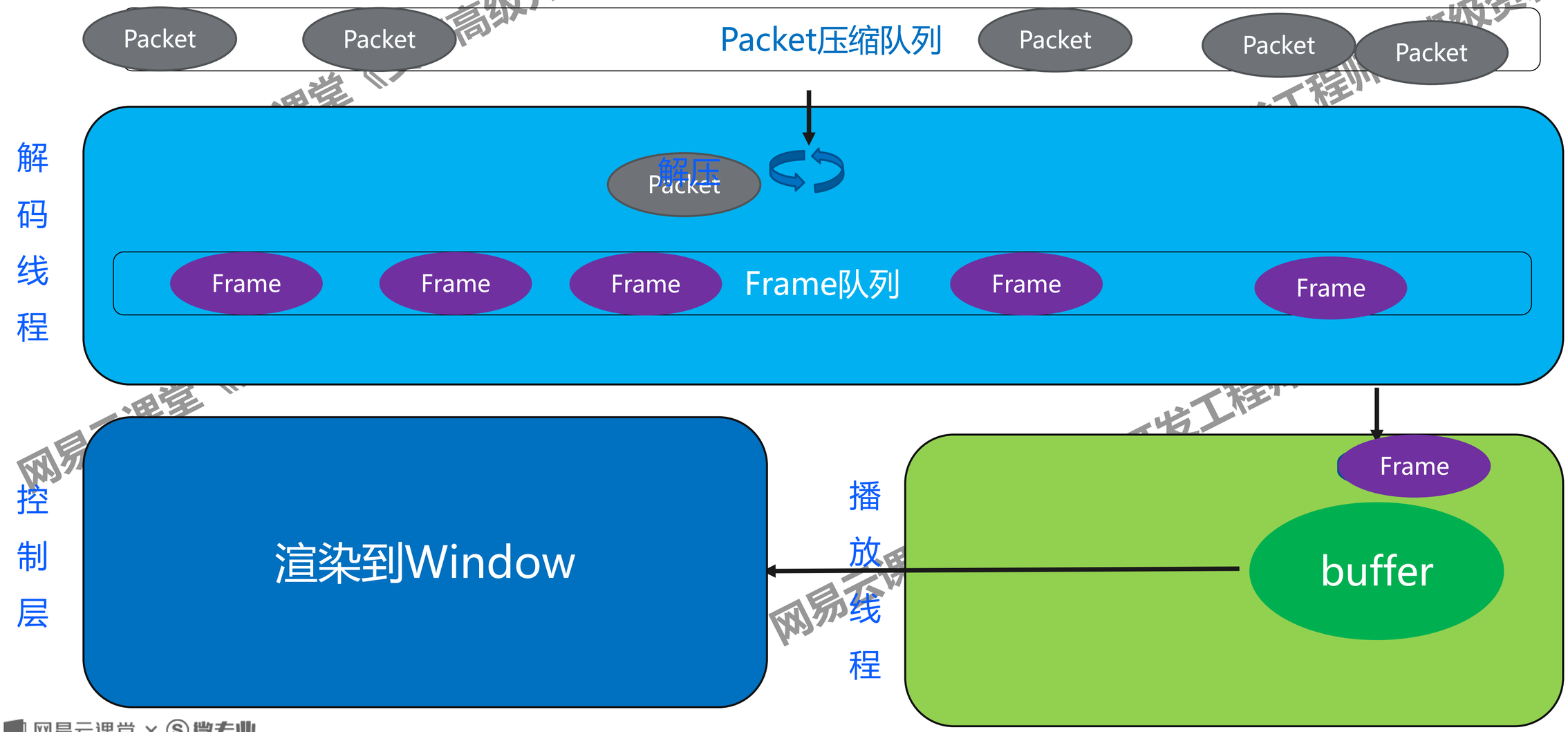
视频层

作用: 解码Packet 转换成Frame



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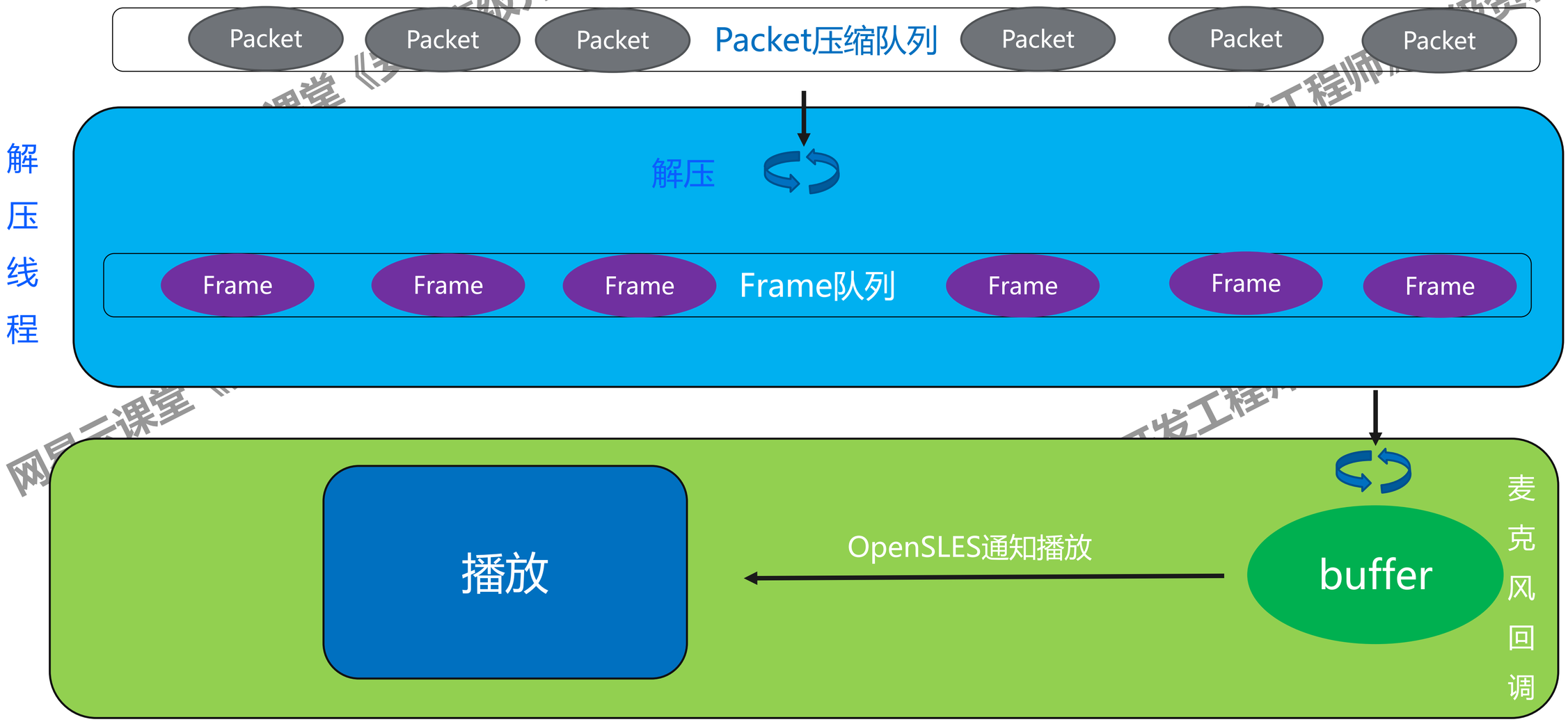
音频层

作用: 解码Packet 转换成Frame



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AVRational

```
typedef struct AVRational{
    int num; ///< numerator
    int den; ///< denominator
} AVRational;
```

AVRational这个结构标识一个分数

1 num为分数

2 den为分母。

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AVRational

- 意思

DTS， Decoding Time Stamp，解码时间戳，告诉解码器packet的解码顺序。

PTS， Presentation Time Stamp，显示时间戳，指示从packet中解码出来的数据的显示顺序。

音频中二者是相同的，但是视频由于B帧（双向预测）的存在，会造成解码顺序与显示顺序并不相同，也就是视频中DTS与PTS不一定相同。

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AVRational time_base;

- 含义是时间 刻度

```
AVStream->AVCodecContex->time_base     {1,100}
```

音频中二者是相同的，但是视频由于B帧（双向预测）的存在，会造成解码顺序与显示顺序并不相同，也就是视频中DTS与PTS不一定相同。

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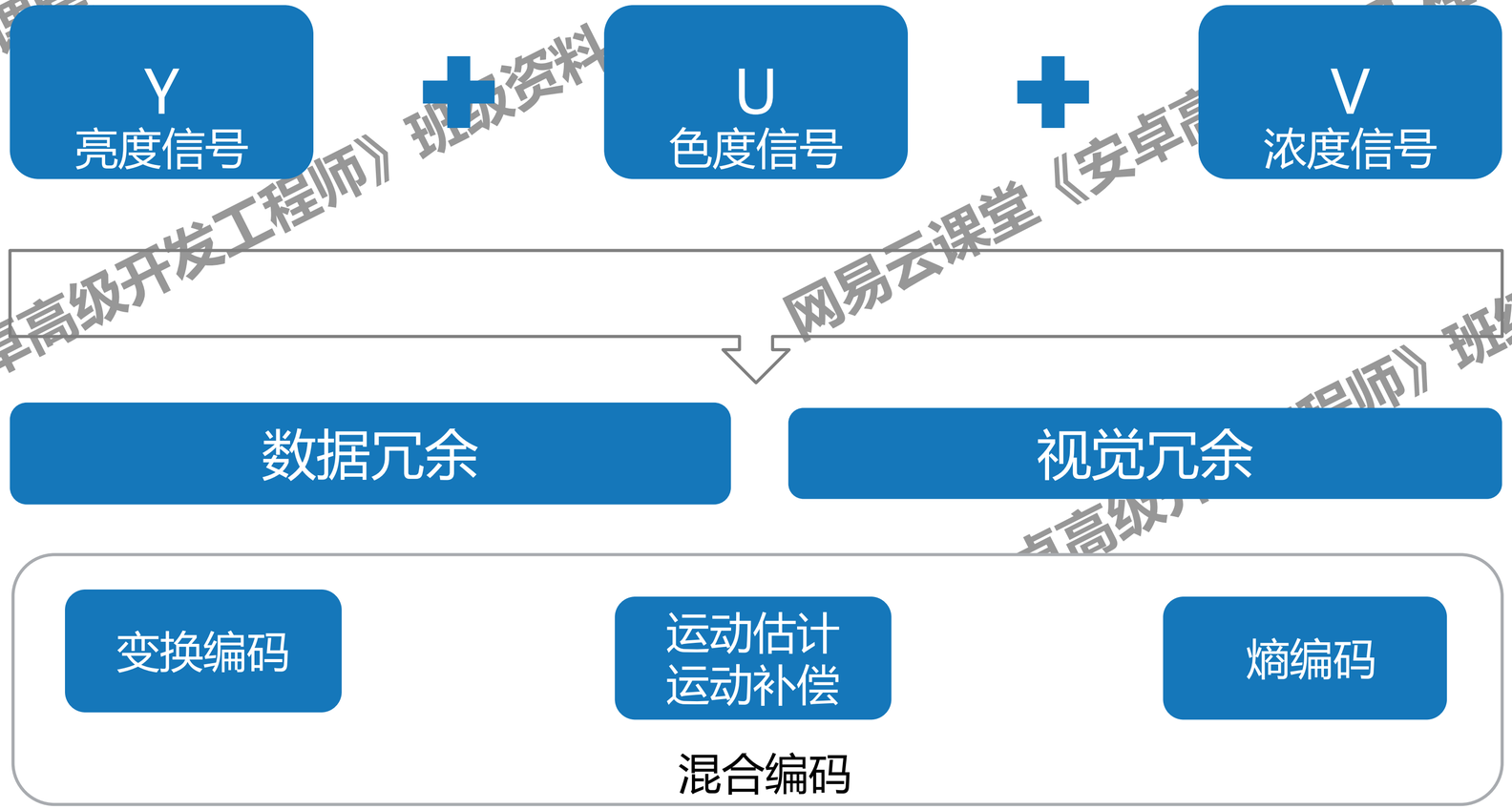
视频编码原理

YUV信号采集之后通过数据冗余和视觉冗余这两个基本条件，再通过混合编码算法、交换编码、运动估计和运动补偿、熵编码三种结合来进行压缩编码。



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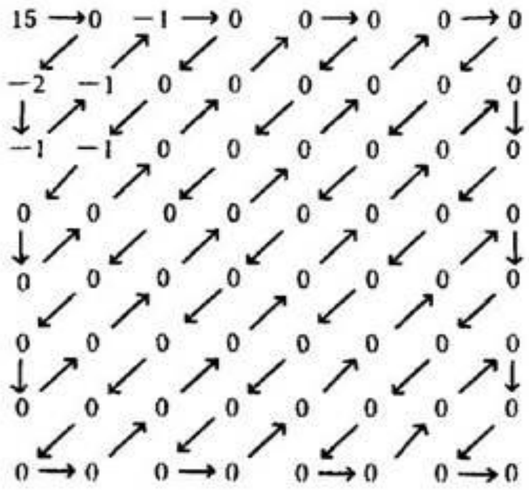
变换编码

139	144	149	153	155	155	155	155
144	151	153	156	159	156	156	156
150	155	160	163	158	156	156	156
159	161	162	160	160	159	159	159
159	160	161	162	162	155	155	155
161	161	161	161	160	157	157	157
162	162	161	163	162	157	157	157
162	162	161	161	163	158	158	158

8x8图像块

236	-1.0	-12	-5.2	2.1	-1.7	-2.7	-1.3
-22	-18	-6.2	-3.2	-2.9	-0.1	0.4	-1.2
-11	9.3	-1.6	1.5	0.2	-0.9	-0.6	-0.1
-7.1	-1.9	0.2	1.5	1.6	-0.1	0	0.3
-0.6	-0.8	1.5	1.6	-0.1	-0.7	0.6	1.3
-1.8	-0.2	1.6	-0.1	-0.8	1.5	1	-1
-1.3	-0.4	-0.3	-1.5	0.5	1.7	1.1	-0.8
-2.6	1.6	-3.8	-1.8	1.9	1.2	-0.6	-0.4

图像块经过DCT变换后的系数



量化后的DCT系数

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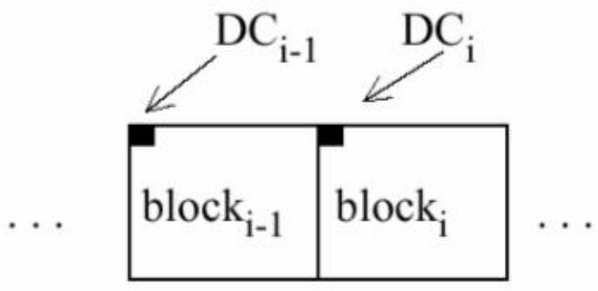
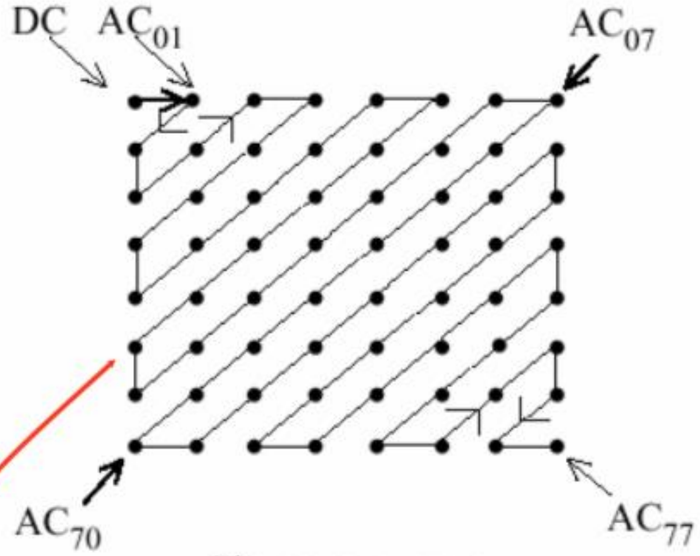
熵编码



DIFF = DC$_i$ - DC$_{i-1}$

Differential DC encoding

Huffman coded



Zigzag sequence

Runlength coding then huffman or arithmetic coding

出处：视频压缩编码和音频压缩编码的基本原理

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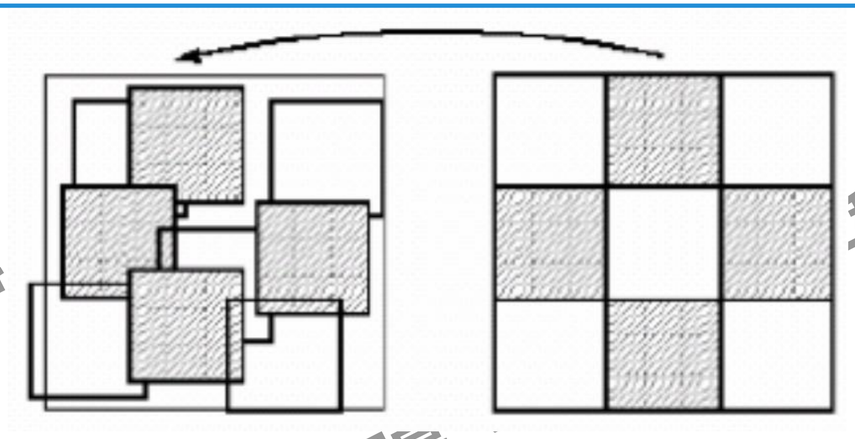
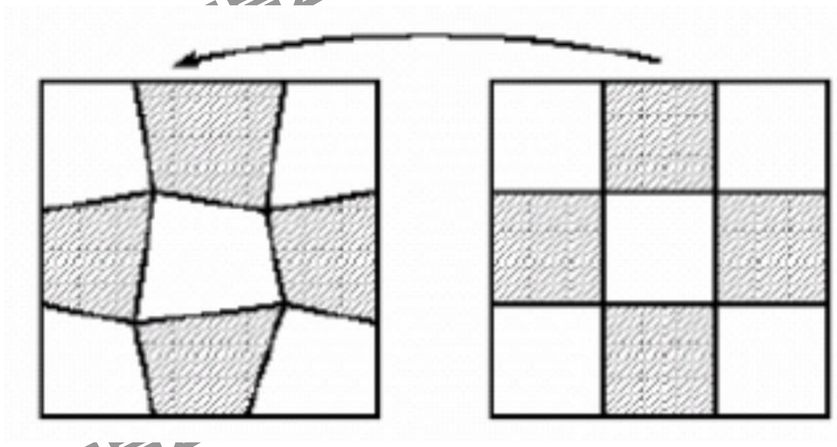
运动估计和运动补偿

运动估计示例

基于块的运动估计
基于网格的运动估计



a 基于块的运动估计



b 基于网格的运动估计

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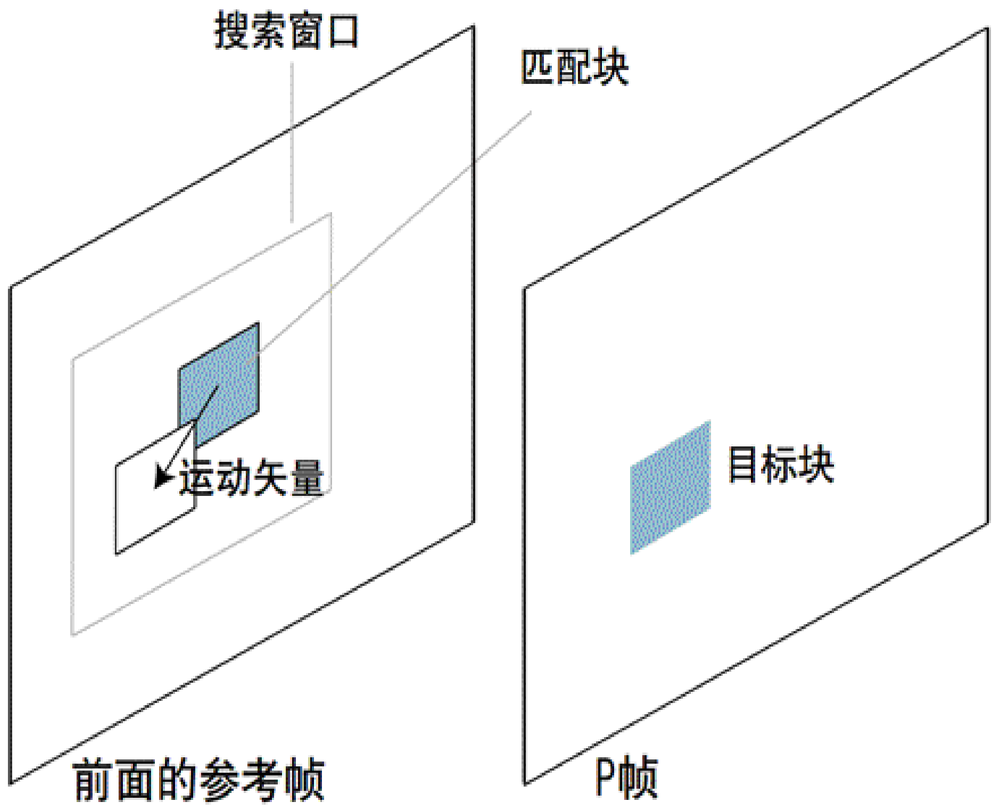
运动估计和运动补偿

运动补偿示例

参考帧
P帧



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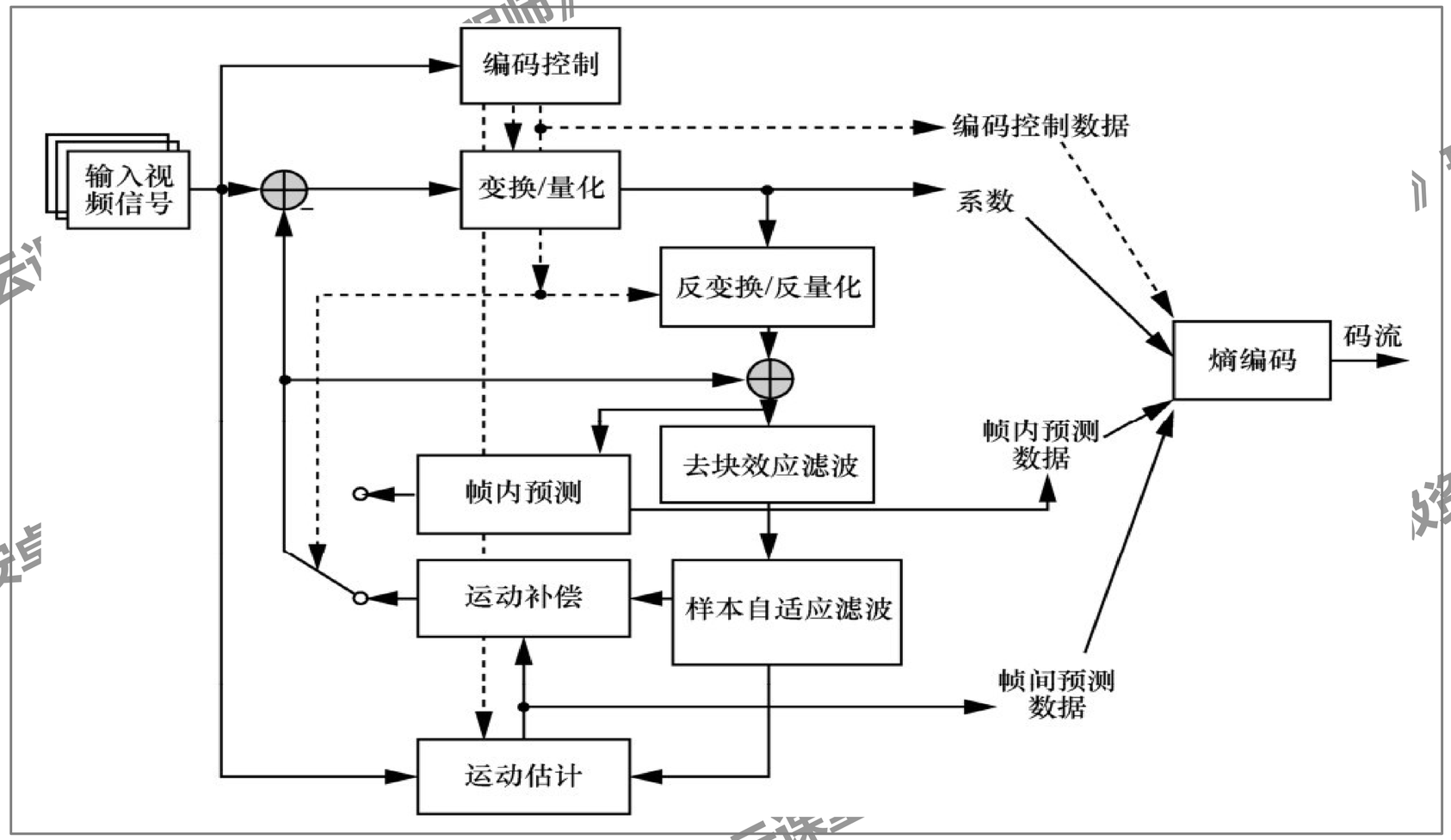
混合编码



混合编码模型，该模型普遍应用于MPEG1，MPEG2，H.264等标准中。

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谢谢观看