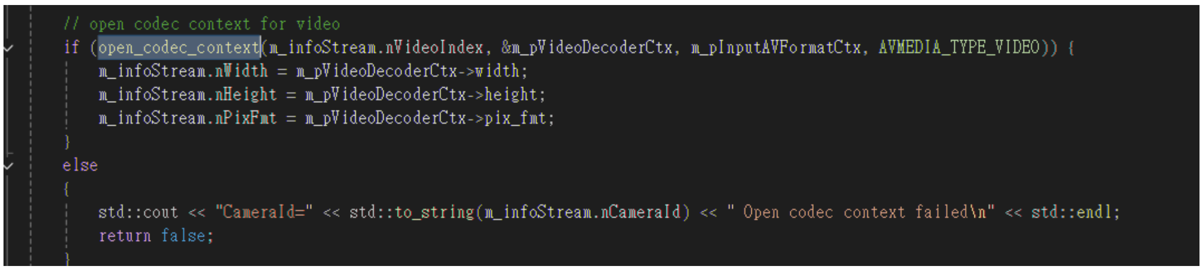
NVIDIA CUDA硬解碼函數

引用函數open_codec_context



```
    // open codec context for video
    if (open_codec_context(m_infoStream.nVideoIndex, &m_pVideoDecoderCtx, m_pInputAVFormatCtx, AVMEDIA_TYPE_VIDEO)) {
        m_infoStream.nWidth = m_pVideoDecoderCtx->width;
        m_infoStream.nHeight = m_pVideoDecoderCtx->height;
        m_infoStream.nPixFmt = m_pVideoDecoderCtx->pix_fmt;
    }
    else
    {
        std::cout << "CameraId=" << std::to_string(m_infoStream.nCameraId) << " Open codec context failed\n" << std::endl;
        return false;
    }
```

```
/*
* 打開解碼器
*參考技術文庫
* https://ffmpeg.xianwaizhiyin.net/api-ffmpeg/decode.html
* https ://blog.csdn.net/weixin_43147845/article/details/136834165
* avMediaType 是傳入確定是 VIDEO 還是AUDIO
*/
/**
 * enum AVHWDeviceType {
 *      AV_HWDEVICE_TYPE_NONE,
 *      AV_HWDEVICE_TYPE_VDPAU,
 *      AV_HWDEVICE_TYPE_CUDA,
 *      AV_HWDEVICE_TYPE_VAAPI,
 *      AV_HWDEVICE_TYPE_DXVA2,
 *      AV_HWDEVICE_TYPE_QSV,
 *      AV_HWDEVICE_TYPE_VIDEOTOOLBOX,
 *      AV_HWDEVICE_TYPE_D3D11VA,
 *      AV_HWDEVICE_TYPE_DRM,
 *      AV_HWDEVICE_TYPE_OPENCL,
 *      AV_HWDEVICE_TYPE_MEDIACODEC,
 *      AV_HWDEVICE_TYPE_VULKAN,
 * }
 * 通过 av_hwdevice_get_type_name
 *   hw_type_names[] = {
 *      [AV_HWDEVICE_TYPE_CUDA]    = "cuda",
 *      [AV_HWDEVICE_TYPE_DRM]     = "drm",
 *      [AV_HWDEVICE_TYPE_DXVA2]   = "dxva2",
 *      [AV_HWDEVICE_TYPE_D3D11VA] = "d3d11va",
 *      [AV_HWDEVICE_TYPE_OPENCL] = "opencl",
 *      [AV_HWDEVICE_TYPE_QSV]     = "qsv",
 *      [AV_HWDEVICE_TYPE_VAAPI]   = "vaapi",
 *      [AV_HWDEVICE_TYPE_VDPAU]   = "vdpau",
 *      [AV_HWDEVICE_TYPE_VIDEOTOOLBOX] = "videotoolbox",
 *      [AV_HWDEVICE_TYPE_MEDIACODEC] = "mediacodec",
 *      [AV_HWDEVICE_TYPE_VULKAN] = "vulkan",
 * }
 *
 * AV_PIX_FMT_QSV 英特尔的qsv
 * AV_PIX_FMT_CUDA 英伟达cuda
 *
 * 之前的版本:
https://github.com/lawtatfaitony/MediaGuardCmakeV3/blob/main/MediaGuard_Cmake/Med
iaGuard/src/RtspStreamHandle.cpp
 */

bool RtspStreamHandle::open_codec_context(int& nStreamIndex, AVCodecContext**
pDecoderCtx, AVFormatContext* pFmtCtx, enum AVMediaType avMediaType)
{
    AVStream* pStream = nullptr;
    AVCodec* pDecoder = nullptr;
    AVDictionary* pOptions = nullptr;

#ifdef _WIN32
    int stream_index = av_find_best_stream(pFmtCtx, avMediaType, -1, -1,
(AVCodec**)&pDecoder, 0);  //據說可以 把參數 AVCodec **decoder_ret 傳入 null
#endif

#ifdef __linux__
    int stream_index = av_find_best_stream(pFmtCtx, avMediaType, -1, -1, (const
AVCodec**)&pDecoder, 0);
#endif


    if (stream_index < 0)
    {
        fprintf(stderr, "Couldn't find %s stream in input\n",
av_get_media_type_string(avMediaType));
        return false;
    }
    nStreamIndex = stream_index;

    //初始化像素格式的值
    //nPixeFmt 獲得像素格式格式 CUDA的像素格式 : AV_PIX_FMT_CUDA
    AVPixelFormat nPixeFmt = AV_PIX_FMT_NONE;

    //if (AVMEDIA_TYPE_VIDEO == avMediaType && m_infoStream.nHDType >
AV_HWDEVICE_TYPE_NONE)
    if (AVMEDIA_TYPE_VIDEO == avMediaType)
    {
        // 是否存在 NVIDIA CUDA 硬件支持 如果存在 則 nPixeFmt 賦值為支持的像素格式
        for (int i = 0;; i++)
        {
            try {
                const AVCodecHWConfig* pConfig = avcodec_get_hw_config(pDecoder,
i);
                if (nullptr == pConfig)
                {
                    break;
                }

                if (!pConfig)
                {
                    fprintf(stderr, "Decoder %s does not support device type
%s.\n",
                        pDecoder->name,
av_hwdevice_get_type_name((AVHWDeviceType)m_infoStream.nHDType));
```

```
                    //打印解码器类型
                    av_log(NULL, AV_LOG_INFO, "Decoder %s does support device
type %s.\n", pDecoder->name,
av_hwdevice_get_type_name((AVHWDeviceType)m_infoStream.nHDType));
                    std::cout << "\nDecoder " << pDecoder->name << " does support
device type" << "av_hwdevice_get_type_name = " <<
av_hwdevice_get_type_name((AVHWDeviceType)m_infoStream.nHDType) << "\n" <<
std::endl;
                    return false;
                }

                // 檢查當前硬件配置是否支持通過硬件設備上下文（HW_DEVICE_CTX）的方式進行硬
件加速。
                // AV_CODEC_HW_CONFIG_METHOD_HW_DEVICE_CTX 是一個常量，表示硬件設備上
下文方法。
                // 如果 硬件類型為 AV_HWDEVICE_TYPE_CUDA (NVIDIA CUDA)
m_infoStream.nHDType = kHWDeviceTypeCUDA
                //if (pConfig->methods & AV_CODEC_HW_CONFIG_METHOD_HW_DEVICE_CTX
&& pConfig->device_type == m_infoStream.nHDType)

                if (pConfig->methods & AV_CODEC_HW_CONFIG_METHOD_HW_DEVICE_CTX &&
pConfig->device_type == m_infoStream.nHDType) {

                    nPixeFmt = pConfig->pix_fmt;

                    fprintf(stderr, "Decoder %s does support device type %s.\n",
pDecoder->name, av_hwdevice_get_type_name((AVHWDeviceType)pConfig->device_type));
//打印解码器类型
                    av_log(NULL, AV_LOG_INFO, "Decoder %s does support device
type %s.\n", pDecoder->name,
av_hwdevice_get_type_name((AVHWDeviceType)m_infoStream.nHDType));
                    break;
                }
            }
            catch (...)
            {
                fprintf(stderr, "get AVCodecHWConfig fail %s \n",
av_get_media_type_string(avMediaType));
                av_log(NULL, AV_LOG_INFO, "hw_decoder_init fail %s \n",
av_get_media_type_string(avMediaType));
            }
        }
    }



    /* Allocate a codec context for the decoder */
    *pDecoderCtx = avcodec_alloc_context3(pDecoder);
    if (!*pDecoderCtx)
    {
        fprintf(stderr, "Failed to allocate the %s codec
context\n",av_get_media_type_string(avMediaType));
        return false;
    }

    /* Copy codec parameters from input stream to output codec context */
    pStream = m_pInputAVFormatCtx->streams[nStreamIndex];
    if ((stream_index = avcodec_parameters_to_context(*pDecoderCtx, pStream-
>codecpar)) < 0)
    {
        fprintf(stderr, "Failed to copy %s codec parameters to decoder
context\n", av_get_media_type_string(avMediaType));
        return false;
    }

    // VIDEO ---------------------------------------------------------------------
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    // init the hard device decoder
    if (AVMEDIA_TYPE_VIDEO == avMediaType && nPixeFmt != AV_PIX_FMT_NONE)
    {
        try {
            (*pDecoderCtx)->get_format = get_hw_format;
            (*pDecoderCtx)->pix_fmt = nPixeFmt;
            //hw_decoder_init(*pDecoderCtx,
(AVHWDeviceType)m_infoStream.nHDType);
            hw_decoder_init(*pDecoderCtx, (AVHWDeviceType)kHWDeviceTypeCUDA); //
原版本來自 m_infoStream.nHDType 現在硬性規定只有一種硬件解碼 CUDA

            fprintf(stderr, "hw_decoder_init success %s \n",
av_get_media_type_string(avMediaType));
            av_log(NULL, AV_LOG_INFO, "hw_decoder_init success %s \n",
av_get_media_type_string(avMediaType));
        }
        catch (...)
        {
            fprintf(stderr, "hw_decoder_init fail!!! %s \n",
av_get_media_type_string(avMediaType));
            av_log(NULL, AV_LOG_INFO, "hw_decoder_init success %s \n",
av_get_media_type_string(avMediaType));
        }
    }
    else {
        fprintf(stderr, "init the hard device decoder fail!! : %s \n",
av_get_media_type_string(avMediaType));
    }



    // AUDIO ---------------------------------------------------------------------
----------------------------------------------------
    //初始化音频 的硬件解码 以下的没法测试 ,补充于2023年1月28日
    if (AVMEDIA_TYPE_AUDIO == avMediaType && nPixeFmt != AV_PIX_FMT_NONE &&
nStreamIndex != -1)
    {
        try {
            (*pDecoderCtx)->get_format = get_hw_format;
            (*pDecoderCtx)->pix_fmt = nPixeFmt;
            hw_decoder_init(*pDecoderCtx, (AVHWDeviceType)kHWDeviceTypeCUDA); //
原版本來自 m_infoStream.nHDType 現在硬性規定只有一種硬件解碼 CUDA
        }
        catch (...)
        {
            fprintf(stderr, "audio decode hw_decoder_init fail!!! %s \n",
av_get_media_type_string(avMediaType));
```

```
            av_log(NULL, AV_LOG_INFO, "audio decode hw_decoder_init fail %s \n", 
av_get_media_type_string(avMediaType));
        }
    }
    else {
        fprintf(stderr, "No AVMEDIA_TYPE_AUDIO (line 351): %s \n", 
av_get_media_type_string(avMediaType));
    }

    /*
    * Init the decoders, with or without reference counting
    * 重新計算幀的數量
    */
    av_dict_set(&pOptions, "refcounted_frames", m_infoStream.nRefCount ? "1" : 
"0", 0);
    if ((stream_index = avcodec_open2(*pDecoderCtx, pDecoder, &pOptions)) < 0)
    {
        fprintf(stderr, "Failed to open %s codec\n",
            av_get_media_type_string(avMediaType));
        return false;
    }

    return true;
}
```