



Open-source Video Encoder/Decoder

June, 2010



Outline

1. Introduction
2. Instruction Optimization
3. Multithread-Encoding
4. XAVS Transcoding Support
4. Performance Results
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Introduction



What is XAVS?

[XAVS](#) is an open-source project which is registered at [Sourceforge.net](#) aims to implement high quality AVS encoder and decoder.
<http://xavs.sourceforge.net/>

Please refer AVS_M2689 for more basic information.



Instruction Optimization



Instruction Optimization

1. X86 Intel Platform Instruction Optimization
2. Module Optimization with SSE, MMX SIMD instructions
 - Motion Estimation
 - Motion Compensation
 - Prediction
 - Deblocking
 - Transform
 - Quantization



Instruction Optimization

Motion Estimation

xavs_pixel_sad_16x16	xavs_pixel_sad_16x8
xavs_pixel_sad_8x16	xavs_pixel_sad_8x8
xavs_pixel_ssd_16x16	xavs_pixel_ssd_16x8
xavs_pixel_ssd_8x16	xavs_pixel_ssd_8x8
xavs_pixel_satd_16x16	xavs_pixel_satd_16x8
xavs_pixel_satd_8x16	xavs_pixel_satd_8x8

Motion Compensation

xavs_pixel_avg_w8_mmxext	xavs_pixel_avg_w16_mmxext
xtxavs_pixel_avg_w16_sse2	xavs_mc_copy_w8_mmx
xavs_mc_copy_w16_mmx	xavs_mc_copy_w16_sse2
xavs_mc_chroma_mmxext	xavs_horizontal_filter_mmxext
xavs_center_filter_mmxext	



Instruction Optimization

Prediction

predict_8x8_vpredict_8x8_h predict_8x8_dcpredict_8x8_ddl
predict_8x8_ddpredict_8x8_dc_left predict_8x8_dc_toppredict_8x8_dc_128
predict_8x8c_vpredict_8x8c_h predict_8x8c_dcpredict_8x8c_p
predict_8x8c_dc_left predict_8x8c_dc_top predict_8x8c_dc_128

Deblocking

deblock_v_luma_c deblock_h_luma_c deblock_v_chroma_c
deblock_h_chroma_c deblock_v_luma_intra_c deblock_h_luma_intra_c
deblock_v_chroma_intra_c deblock_h_chroma_intra_c



Instruction Optimization

Transform

xavs_sub8x8_dct8_mmx xavs_add8x8_idct8_mmx
xavs_sub8x8_dct8_sse2 xavs_add8x8_idct8_sse2

Quantization

xavs_quant_8x8_core16_mmxext xavs_dequant_8x8_mmx



Multithread-Encoding



Multithread-Encoding

XAVS supports 2 levels multithread encoding:

1. Slice Level (already enable)
2. Frame Level (integration)

For slice-based multithread encoding, each slice is encoded separately on different thread; for frame-based multithread encoding, each frame is encoded separately on different thread. For frame-level encoding, an extra thread is used to analyses the frame information and predetermine the frame coding type and so on.

Frame Multithread Encoding Process:

- Read one original frame
- Push frame to frame-determination Queue
- Pop frame from the frame-determination queue
- Encoding the frame with the frame type determination
- Synchronize the threads and output the data for each thread



XAVS Transcoding Support



XAVS Transcoding Support

FFmpeg XAVS compile Guide

http://xavs.sourceforge.net/xavs_ffmpeg.html

FFmpeg Transcoding Instructions:

```
ffmpeg -i "INPUT_FILE_NAME" [options] -vcodec libxavs "OUTPUT_FILE_NAME"
```

```
ffmpeg -i "INPUT_FILE_NAME" -vframes 300 -cqp 29 -refs 2 -bf 2 -g 16 -s widthxheight -  
vcodec libxavs "OUTPUT_FILE_NAME"
```



XAVS Transcoding Support

Feature

Support almost all the video format transcoding to AVS video
(mpeg1, mpeg2, vc1, mpeg4, h263, h264, vp6 and etc.)

FFmpeg support Guide

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FFmpeg Transcoding Instructions:

```
ffmpeg -i "INPUT_FILE_NAME" [options] -vcodec libxavs "OUTPUT_FILE_NAME"
```

```
ffmpeg -i "INPUT_FILE_NAME" -vframes 300 -cqp 29 -refs 2 -bf 2 -g 16 -s widthxheight -  
vcodec libxavs "OUTPUT_FILE_NAME"
```



XAVS Transcoding Support

Example:(h264 -> avs , x264 video -> xavs encoding)

1. Transcode AVS Video

`./ffmpeg -i beijing.olympics.2008.opening.ceremony.720p.hdtv.mkv -b 5000k
-vcodec libxavs beijing.olympics.2008.opening[xavs].avs`

Input #0, matroska, from 'beijing.olympics.2008.opening.ceremony.720p.hdtv.x264-orenji.mkv':

Duration: 03:28:39.29, start: 0.000000, bitrate: 384 kb/s

Stream #0.0: Audio: ac3, 48000 Hz, 5.1, s16, 384 kb/s

Stream #0.1(eng): Video: h264, yuv420p, 1280x720, PAR 1:1 DAR 16:9, 29.97 fps, 29.92 tbr, 1k tbn, 59.94 tbc

[libxavs @ 0xa48c8b0]no need for a SAR

[libxavs @ 0xa48c8b0]using cpu capabilities

Output #0, **cavsvideo**, to 'beijing.olympics.2008.opening[xavs].avs':

Stream #0.0(eng): Video: libxavs, yuv420p, 1280x720 [PAR 1:1 DAR 16:9], q=2-31, 5000 kb/s, 90k tbn, 29.92 tbc

Stream mapping:

Stream #0.1 -> #0.0

2. Package the AVS video to AVS File format

`AvsCreator.exe -rate=30 -create=beijing.olympics.2008.opening[xavs].avs
beijing.olympics.2008.opening[xavs].asm`



Demo

XAVS Transcoding with FFmpeg



Future Plan

Coding Speed

- Multithread Encoding Improvement
- Instruction Level Optimization (Further Improve the SSE)

AVS Video Package

- Integrate AVS video package to AVS system format
 - Package AVS Video .avs to AVS file format .asm



How to join XAVS

XAVS Web Pages

<http://xavs.sourceforge.net/>

XAVS Mail list

If you want to subscribe to this mail list .

General information about the mailing list is at:

<https://lists.sourceforge.net/lists/listinfo/xavs-develop>



Thank You!

