QuickTime: Performance Tips for Digitizing Video (11/95)

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TOPIC ---

This article provides tips for producing digitized video. There are a number of things you can do to improve capture performance and increase the frame rate of your movies. Some of these tips improve performance, and others only adjust performance marginally.

DISCUSSION ---

PRODUCTION STRATEGIES

One of the most important elements in producing QuickTime video movies is the quality of the original footage. The better the quality of the original video, the better the quality of the final QuickTime movie.

- Hi-8, S-VHS, Beta or 3/4" (Umatic) video produces better results than VHS or 8mm
- Always use a new tape when shooting.
- Add light when shooting indoors to improve contrast and reduce video noise.
- Use a tripod to reduce camera shake.
- Avoid large sudden movements of the camera, either pans or zooms.
- Move the microphone off camera if possible. Purchase a shot-gun microphone.

Making the Connection

Do not overlook the connections between your equipment!

- Use S-Video cable rather than RCA cables (if possible). S-Video signal retains more fidelity than the composite signals.
- Use good quality cables and connectors.
- Use component video (separate RGB cables) rather than S-Video cable if your digitizing board and VCR support this type of connection.

TIPS FOR IMPROVING THE FRAME RATE

Defragment your disk drive!

A badly fragmented drive impacts performance.

Turn Off AppleTalk and Non-Essential Extensions

Turning off AppleTalk improves performance. Turning off other non-essential screen extensions can also improve performance.

Set the Screen Depth to 16 Rather than 24 Bits

If your digitizing card supports both 16 and 24 bit screen depths, then digitize at 16 bits; particularly if you are using the Apple Video Compressor.

A 16 bit image is 2/3 the size of a 24 bit image. The smaller sized image can be passed around much faster. The image quality of 16 versus 24 is very similar. The Apple Video Compressor only saves 16 bit information anyway.

QuickTime relative performance in order of bit-depth, 1 being better performance:

1. 16-bit
2. 24/32-bit
3. 8-bit
4. 1-bit

Reduce the Frame Size

The size of the frame affects the frame rate. Reducing the frame size increases the frame rate of the movie. When adjusting the frame size remember to check the frame size before recording. Note down the frame size and check it before you begin a recording session. It’s very easy to adjust the frame size for one or two movies, then forget to adjust it for a second digitizing session.

Use the None Compressor

Capturing using the None Compressor generally produces the highest frames rates (though if you have a fast processor, the Apple Video Compressor may be just as efficient.) Capture using the None Compressor and then recompress using the Apple Video Compressor or the Compact Video Compressor. Several Applications, including VideoShop (Avid) and Movie Recorder (Apple) offer automatic post-compression options. These programs capture using the None Compressor, then immediately recompress using the compressor of your choice. We don’t recommend using the Compact Video compressor in these situations.

NOTE: This does NOT apply to recording using the VideoSpigot with the ScreenPlay application. ScreenPlay uses a special compressor which provides much higher frame rates. Also, if you are using the VideoSpigot, then use the application ScreenPlay to capture movies rather than recording in an application like Premiere or Movie Recorder. Much higher frame rates are possible using ScreenPlay.

Use Faster Equipment

• Faster storage device. A faster hard disk usually improves your capture performance.

QuickTime relative performance on storage devices, 1 being better performance:

1. RAID devices on PCI SCSI cards
2. RAID devices on NuBus SCSI cards
3. Large internal hard disks on direct SCSI interfaces
4. Large internal hard disks on IDE interfaces
5. Small internal hard disks on direct SCSI interfaces
6. Small internal hard disks on direct IDE interfaces
7. Quad speed CD-ROM drives
8. Double speed CD-ROM drives
9. Single speed CD-ROM drives
10. Floppy disks

• Faster processor. A faster processor improves your capture performance.
QuickTime relative performance on processors, 1 being better performance:

1. 150Mhz PowerPC 604
2. 132Mhz PowerPC 604
3. 120Mhz PowerPC 604
4. 110Mhz PowerPC 601
5. 100Mhz PowerPC 601
6. 40Mhz Motorola 68040
7. 66/33 MHz Motorola 68040 (includes FPU)
8. 66/33 MHz Motorola 68LC040
9. 117Mhz PowerPC 603e
10. 100Mhz PowerPC 603e

• Hardware compression boards (such as RasterOps MoviePak, SuperMacs Digital Film, and Radius VideoVision Studio) produce the highest frame rates possible. All three are capable of 30 frames per second, but they require fast processors (ideally a Quadra), fast hard disks (usually a disk array) and produce very large files which can take a long time to recompress.

Use Special Capture Applications

It is possible to capture high frame rate movies without buying a new computer or hardware acceleration board. The utility Grab Guy (on the Apple QuickTime CD) performs multi-pass captures using a computer controllable Sony VCR (generally only the professional decks with time code support). Grab Guy captures every 6 frames (or so) and does multi-passes to record the whole movie.

VideoToolKit from Abbate Video offers a step-record option. Using just about any controllable VCR, VideoToolKit places the VCR in pause, digitizes the frame, steps the VCR forward a frame, and digitizes the next frame. This requires a VCR with a clean pause, and places extra stress on the tape, but is a cheap alternative for capturing clips.

DETERMINING THE OPTIMUM FRAME RATE

It’s important to remember that the optimum frame rate is dependent not just on the capture hardware, but also on the playback platform. If you are recording for distribution on CD-ROM, Apple recommends the following:

180 x 160 at 12 frames per second (compressed using Apple Video Compressor) 240 x 180 at 12 frames per second (compressed using the Compact Video Compressors)

These numbers are designed to provide acceptable performance when playing on an LC from a standard speed CD-ROM. If the processor speed is larger, or a double-speed CD-ROM is assumed, then these figures increase.

KNOW YOUR COMPRESSION ALGORITHM

The more you know about the compression algorithm you are using, the better you will know how to use it, and how to adjust the various parameters for best results. For example, reducing the luminance (brightness information) information in an image will have a greater effect on compression performance than adjusting the chrominance (color). Most compression algorithms make use of the fact that the eye is less sensitive to changes in chrominance information than changes in luminance information . Many algorithms use color-subsampling to reduce the chrominance information. However, reducing the luminance information can reduce the data rate as well.

- Make sure the frame size is divisible by 4. The Compact Video Compressor is most efficient if the frame size (both horizontal and vertical) is evenly divisible by 4. i.e. 240 x 180 is okay, but 242 x 182 is not as efficient.

ADJUST KEY FRAMES

Reducing the frequency of key frames will usually reduce the data rate, and improve performance, however reducing the key frame rate reduces performance when playing the movie in reverse, or when trying to skip ahead in a movie. Generally the Key Frame rate should be set to one per second of video, but if you know the movie will not be interrupted, searched or played in reverse, then you can increase this figure.

USE FILTERED DOWN SAMPLING

Most of the digitizing boards simply ignore or skip pixels to reduce the image size. For example, to create a 320 x 240 image, every second pixel is ignored. This results in stair stepping (aliasing) effects. To reduce these effects, capture the movie at a larger size, then recompress and resize the movie using filtered down sampling. ConvertToMovie and MovieShop both offer this option.

SOUND

- Capture at 22 kHz. This provides best quality. Downsample to 11 kHz for best quality and smallest size for distribution.
- To adjust the sound track, you can export the sound file from Premiere as an AIFF file and then use Sound Edit or another sound editing program to adjust the sound. Then bring the sound back into Premiere.
- The MacRecorder does not accurately stay at 22 kHz during recording. Use MovieShop to resample the sound during compression.

CREATING QUICKTIME ANIMATIONS

PROMotion exports an animation to QuickTime. MovieWorks saves all of its animation in QuickTime format. MacroMind Director can save movies to QuickTime format, as well as play movies within an animation (you must have version 3.1 to do this. Also, if you are using hardware acceleration, get version 3.2 which fixes a problem in Director.)

3D PROGRAMS SUPPORT QUICKTIME

Many 3D programs now support QuickTime. Typestry from Pixer saves flying logos as a QuickTime movie. Infini-D can export a 3D animation to QuickTime. It also lets you use a QuickTime movie as a surface within an animation (so you can have a QuickTime movie playing within a television set.)

PLAYING MOVIES IN HYPERCARD

Both Apple and Claris have released XCMDs for playing QuickTime movies in HyperCard. The Apple XCMDs are on the Apple QuickTime Developer CD, while the Claris XCMDs are available as part of HyperCard (and were available as an upgrade to owners of HyperCard. These XCMDs are different—the Apple XCMDs offer more sophisticated functions, but are not officially supported. You must license either set to distribute with your HyperCard stacks.

USE JPEG COMPRESSOR TO STORE MOVIES

Movie size can be reduced drastically by recompressing using the JPEG compressor. However, the movie does not play well when compressed using JPEG.

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29 Nov 1995 - Corrected minor typo.
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