QuickTime: Guidelines for Using Compressors

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TOPIC ---

We are a little confused about compression alternatives, and uncertain about how we might accelerate compression. When does JPEG make sense?

DISCUSSION ---

Below is a section from the QuickTime Developer's Guide that is included on the QuickTime 1.0 Developer's CD. It gives specific information about each of the compressors that Apple has included in QuickTime, including guidelines on when each should be used.

Photo Compressor

The photo compressor implements the Joint Photographic Experts Group (JPEG) algorithm for image compression. JPEG is an international standard for compressing still images. The version of JPEG supplied with QuickTime complies with the baseline International Standards Organization (ISO) standard bitstream, version 9R9. This algorithm is best suited for use with still images.

The photo compressor performs best on images that vary smoothly or that do not have a large percentage of their areas devoted to edges or other types of sharp detail. This is the case for most natural images. In practice, you will find that compression ratios are highly dependent on source images, but they generally range from 5:1 to 50:1 at 24 bits-per-pixel, with good picture quality resulting from compression ratios between 10:1 and 20:1.

Picture quality is generally very good to exceptional and is often good enough for use in demanding desktop publishing applications. Very high-resolution images obtained through the use of 24-bit color scanners would best be compressed using the photo compressor.

On a Macintosh IIsi using a compression ratio of 10:1, the photo compressor can compress a 24-bit 640-by-480 pixel image at a normal quality setting in 7.5 seconds. Decompressing the same image takes 7 seconds.

Video Compressor

The video compressor employs an image-compression method developed by Apple. This method was designed to permit very fast decompression times while maintaining reasonably good picture quality. This algorithm's rapid decompression allows applications to display 24-bit images at interactive speeds. This algorithm is best suited for use with sequences of video data.

The video compressor is best suited to digitized video content rather than synthetically generated images. This compressor supports both spatial and temporal compression. If you use only spatial compression, you obtain compression ratios from 5:1 to 8:1 with reasonably good quality at 24-bit pixel depths. If you use both spatial and temporal compression, the compression ratio range extends from between 5:1 to 25:1.

The video compressor can be used for computer animation as well as digitized video, but you obtain higher image quality using the animation compressor. Similarly, the animation compressor can be used for digitized video as well as animation, though you obtain higher compression ratios from the video compressor.

On a Macintosh IIsi using a compression ratio of 6.5:1, the video compressor can compress a 24-bit 640-by-480 pixel image at a normal quality setting in 3.5 seconds. Decompressing the same image takes 1.0 second.

Animation Compressor

The animation compressor employs a compression algorithm developed by Apple. This technique is best suited to animation and computer-generated video content. In addition, the animation compressor can be used to compress sequences of screen images, as might be generated for a training application.

The algorithm employed by the animation compressor is similar to applying the PICT image format to the temporal domain. A PICT image is stored in run-length encoded format and is lossless. The animation compressor also stores images in run-length encoded format. However, the animation compressor can work in either a lossy or lossless mode. The lossless mode maintains picture content precisely, storing an animation as a series of run-length encoded images. The lossy mode loses some quality, but is fast enough for real-time playback.

The animation compressor's performance and achieved compression ratios are highly dependent on the type of images in a scene. The animation compressor is very sensitive to picture changes, and works best on a clean image that has been generated synthetically. Images captured from videotape generally have considerable visual noise, which can corrupt the inherent similarity of the pixels and make it more difficult for the animation compressor to achieve good compression.

On a Macintosh IIsi using a compression ratio of 1.3:1, the animation compressor can compress a 24-bit 640-by-480 pixel image at a normal quality

setting in 2.0 seconds. Decompressing the same image takes 1 second.

Graphics Compressor

The graphics compressor employs a compression algorithm developed by Apple. This compressor is best suited to 8-bit still images and image sequences in applications where compression ratio is more important than decompression speed.

The graphics compressor is a good alternative to the animation compressor whenever performance is less important than compression ratio. In general, the graphics compressor generates a compressed image that is one-half the size of the same image compressed by the animation compressor. However, the graphics compressor can decompress the image at only half the speed of the animation compressor. Therefore, you should consider using the graphics compressor with relatively slow storage devices, such as CD-ROM. In these circumstances, the graphics compressor has sufficient time to decompress the image or image sequence.

On a Macintosh IIsi using a compression ratio of 2.5:1, the graphics compressor can compress a 24-bit 640-by-480 pixel image that has been dithered to 8-bit pixel depth at a normal quality setting in 17.0 seconds. Decompressing the same image takes 1.0 second.

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