

Reducing AVI file size

How do I reduce AVI file size?

The main factors that affect file size are:

1. The dimensions of the video in pixels. Recording a smaller area of the screen reduces the file size.
2. The type of audio used. Use compressed audio in the final production. The audio configuration can dramatically affect file size.
3. The amount of movement in the video. Less movement produces smaller files.
4. Color depth especially with video codecs other than TSCC.
5. Type of content of the video, especially when using TSCC.
6. Frame rate.
7. Good practices and design. Keep it simple.

This article will discuss all of these factors in more detail to help you determine some ways that you might reduce the size of your AVI file.

Size of Screen Area Being Recorded

Never record a larger area of the screen than is necessary. For example, if you are recording an application, only record the application window, not the entire desktop. Recording a smaller screen area reduces the file size.

This has nothing to do with the resolution that the monitor is set to, unless you are recording the entire screen. In other words, recording a 640x480 area of the screen on a monitor set to 800x600 is the same as recording a 640x480 area of the screen on a monitor set to 1280x1024. In both cases the size of the screen area being recorded is 640 pixels horizontally and 480 pixels vertically and the resulting video will be 640x480.

When recording the entire screen, the resolution that the monitor is set to will effect the size of the video. Obviously, when recording the entire screen, a monitor set to 640x480 will result in a smaller video than if the screen resolution is set to 1024x768.

Type of Audio

By default, the Camtasia Recorder uses PCM uncompressed audio configured at 22.050 kHz, 16 bit mono. This audio configuration adds 44,100 bytes per second to the size of the file, or about 2.6MB per minute. This is the amount data that must be stored just for the audio portion of the AVI file.

This means that about 22,000 times per second the audio is sampled, and 2 bytes (16 bits) of information is saved. If this same audio configuration were set to stereo, the size of the audio would double, because 4 bytes instead of 2 would be saved 22,000 times per second.

Avoid using stereo, especially for voice. If you really want stereo you can use it, but keep in mind that the size of the audio will double.

Camtasia Recorder uses uncompressed audio because this is the best quality audio, and it can be edited without loss of quality.

Unless there is an overriding reason to not do so, always use good quality PCM uncompressed audio for the original recording and during the postproduction editing process. This will ensure that there is no loss of audio quality when the video is edited. When the editing process is completed, you will have a perfect, high quality master copy of your video from which you can make copies into other compressed audio formats.

Because compressing audio always degrades the quality of the audio, only compress the audio after editing is complete. Every time you edit the video the audio must be recompressed. Every time it's recompressed it loses more quality.

For example, assume that the type of audio compression that you select degrades the audio quality 10% the first time that it is compressed. Now the audio is at 90% of the original quality. If you then edit the video again, causing the audio to be recompressed, an additional 10% reduction of quality occurs and now the audio is at 80% of the original, and so on.

Compressing the audio can drastically reduce the overall size of the video. For example a 1 minute video with PCM uncompressed audio, 22.050kHz, 16 bit mono was 3.9MB. The same video using CCITT u-Law, 11.25kHz, 8 bit mono was 887KB.

Movement Increases File Size

Keep the amount of movement in the video to a minimum, especially movement that causes large areas of the screen to change. Zooming, panning and moving windows around are examples. Transitions, because they change the entire frame also will increase the file size. Movement increases file size. The more the screen changes over the course of the video, the larger the file size will be.

Understanding the reason for this requires an understanding of how video compression works. If you are interested, read on, but suffice it to say that movement increases file size.

Video Compression and Key Frames

As static image files are compressed using various compression algorithms such as JPG, the video and audio data in video files is compressed. This reduces the number of bytes in each frame thus reducing the file size. While data compression helps a considerably, another step is taken to reduce file size.

Video files are a number of still images called frames that are combined sequentially into one file. Each frame is displayed at some given number of frames per second to create the illusion of movement. But many times there is little or no movement or change in the video between one frame and the next.

Consider a video that is a demonstration of some application, and all that is changing in the video is the mouse pointer moving around the application as the author of the video points out different

areas of the application by using the mouse pointer as a pointing device. This could continue for some time, over hundreds of frames of the video. Instead of duplicating the entire frame when the only part of the frame that has changed is the area where the mouse pointer is, only data representing the area of the frame that has changed is saved. If the only change between one frame and the next is that the mouse pointer is in a different position, then the only change to the frame is drawing the mouse pointer in its new position. The mouse pointer is very small and the number of bytes of video data that represents it is minimal, so very little video data needs to be saved between frames.

There are two types of video frames, key frames and delta frames. Key frames contain data representing all of the pixels that comprise the complete frame. Delta frames only contain what has changed from the previous frame. Key frames are placed in the video at regular intervals, either every so many seconds or so many frames. Camtasia Recorder defaults to 1 key frame every 80 frames. It looks something like this:

Key frame | delta frame | delta | delta | delta | key | etc.

If there is no change from one frame to the next, delta frames can contain 0 bytes of data. If the only change from one frame to the next is the movement of the mouse pointer, the delta frame would contain very little data. If the entire frame changed, the delta frame would be as large as a key frame, as it would have to contain bytes of data representing every pixel in the frame.

It now becomes obvious that movement, because it causes changes from one frame to the next, increases the size of the video. The more movement there is, the more area of the screen is changed, resulting in larger delta frames and therefore larger overall file size. Movement increases video file size.

Frame Rate

Frame rate may or may not have significant effect on file size.

- If there is a lot of movement in the video, and therefore delta compression is minimal, decreasing the frame rate can drastically decrease file size.
- If there is little movement in the video and the majority of delta frames contain little or no data, slower frame rates will not have as much effect on file size.
- If there is no movement in the video at all, basically a static image, lowering frame rates will decrease file size inasmuch as there will be fewer key frames.

Screen Color Depth

If the video is compressed with the TechSmith TSCC video codec, color depth may have less effect on file size than with other codecs. It is generally better to make videos at 16 or 24bit color depth, as 256 color videos can suffer palette shift problems and/or playback problems in some players. If you must record with the screen color depth set to 256 colors, for performance reasons for example, it's advisable to change the color depth of the video to 16 or 24 bit for the final production.

Here are some example file sizes of a 60 second video compressed with the TechSmith TSCC video codec:

8 bit color: 808KB

16 bit color 834KB

24 bit color: 867KB

Note however, that with videos that contain real world photography and/or lots of movement, color depth can have a greater effect on TSCC compression.

Screen color depth may affect other video codecs differently. Observe the file sizes of the same 60 second video compressed with the Microsoft Video 1 codec:

8 bit color: 3,936KB

16 bit color: 4,576KB

24 bit color 5,174KB

So, depending on what video codec is used, screen color depth may or may not have much effect.

Video Content

The TSCC codec is highly optimized for compressing videos of "office" type content such as desktop applications that contain large areas of the same color. Making training videos of applications such as Microsoft Word is an example.

TSCC does not compress real world video well at all, such as video from a video camera, real world photography, dithered or gradient surfaces. When using TSCC, if your video must contain these elements, you may wish to experiment with other codecs or video file formats for the final output.

TSCC is perfectly lossless however. So, if file size is not an issue but absolute quality is, or the content of your video compresses well with TSCC, it may be the codec of choice.

Good Practices and Design

Keep the video straight and to the point. Long periods of silence require the same amount of audio data to be stored as if there were narration.

Don't waste time with flashy graphics moving around the screen, transition effects between clips or periods of music just for the sake of entertainment.

Reducing AVI file size, TechSmith Corporation, Retrieved October 2, 2006, Downloaded from http://techsmith.custhelp.com/cgi-bin/techsmith.cfg/php/enduser/std_alp.php