

Video Compression Technology

Video compression is all about removing redundant data to reduce video file sizes so that the files can easily be sent over a network and stored. The general rule of compression is that the higher the compression level, the smaller the file size and the lower the image quality.

The most widely used video compression format in use today is MPEG-2, which is the format used for DVD disks and non-HD cable and satellite television broadcasts. This format is not suitable for surveillance applications, though, because of the high data bandwidth required to transmit the images. There are three newer compression formats right now that are much more suitable for surveillance applications; Motion JPEG, MPEG-4 and H.264.

Motion JPEG: is a digital video format that is comprised of a series of individual JPEG images. Each video frame is encoded in its entirety and transmitted. Motion JPEG is a form of video compression that is very reliable, since even if frames are dropped, the overall video really isn't affected very much, because each frame has all of the information required to reconstruct the original video frame. This feature also makes Motion JPEG the only format suitable for forensic use in surveillance applications, since each frame is a complete image. The only real downside to Motion JPEG is that the compression does not take advantage of all of the redundancy that is inherent in transmitting video images, where most of the information stays the same from video frame to video frame. Thus, more bandwidth is required to transmit the images and more storage space is required.

MPEG-4: is used widely in the surveillance industries and fully supports low-bandwidth applications and applications that require very high-quality images. MPEG-4 encoding differs from Motion JPEG encoding due to the fact that different frames transmit different types of image data. In MPEG-4 encoding a reference frame is sent every so often that contains all of the video image data. Then, the next few frames are sent containing only the parts of the image that have changed from the original reference frame. This greatly reduces the amount of data that must be sent to reconstruct the image. Initially MPEG-4 was aimed at low bit-rate video communications. The down side is that if a reference frame gets lost due to transmission errors, it takes longer to reconstruct the video and restore the video quality. It was much later that the standard was expanded upon to be efficient across a variety of bit-rates ranging from a few kilobits to tens of megabits per second.

H.264: is the latest high-tech extension of the MPEG-4 video encoding standard. The H.264 standard (also known as MPEG-4 AVC) was created to be capable of providing good quality video at even lower bit rates than all previous standards, like MPEG-4. A system using H.264 can reduce the file size of a digital video image without compromising any image quality. This means you will see crisp, clear video in much smaller files, saving you bandwidth and storage costs over the previous generations of video codecs. This compression technology is especially useful in surveillance of highways, airports, casinos and other applications that require the ability to recognize very detailed objects, like a person's face. You are already familiar with the high quality of this format if you have viewed a Blu-ray Disc playback.

H.264 is emerging as the industry leader for video compression. It is fully compatible across many platforms allowing video to be viewed on any computer without specialized software. By improving the compression standards upon which the codec is based, you can transmit higher quality video using the same bandwidth.

WTI offers a few innovative products for compressing, transmitting and storing video – check out the C-MAX Ultra-Video IP Encoder and Video Server on our web site (<http://www.gotowti.com/>) and while you are there don't forget to take a look at our DVRs.

~K. McMillan, WTI

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