UNDERSTANDING VIDEO

Eye of the Beholder by Clearly Ambiguous

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Understanding video in the digital realm

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Working with video can be as simple as pushing a red record button these days, but at times when editing is being difficult, video doesn't seem to want to play across platforms (PC/ Mac) or in a number of other scenarios, video can be a bit troublesome. Before getting ahead of ourselves, it might help here to put this media form in context with others that can be manipulated on a computer, notably audio and images.

For example, an audio recording is often made alongside video footage.

The sounds from the physical world we hear include frequencies ranging from a few Hertz (very, very low or bassy tones) to around 18,000 Hertz

The word "photo" comes from ancient Greek and means "light," whereas "graph" or" graphy" refers to "drawing." Thus a photograph is a drawing made of light

(or 18 Kilohertz, very, very high pitched tones.)

In the case of digital recording these sounds are converted to a digital file (0's, 1's; bits & bytes) in a quality related to the speed that the analog sound is sampled at (sample rate) and the quality of sample itself (bit depth).
So for recordings with a video camera that include sound, this same process exists for the audio that is recorded, though one standard rate is just slightly different for

standard camcorder or video camera audio. Camera audio generally is recorded and converted to audio with a 48,000 Hertz sample rate (differing from the 44,100 Hertz standard for CD audio) at a bit depth (quality of the sample) of 16 bits (which is the same again as the standard for CD audio).
Here's a link for those concept, but only read until after "Quantization" - we don't need the specific info after that.

You might also already be somewhat familiar with the concepts of digital images and how they work on a computer. You should know that there are two fundamental types of computer images, based on how they are created in a computer: vector images and bitmap images.

All digital cameras, including video cameras/ camcorders, create bitmap images (also called raster). These bitmap images consist of elements recorded from the physical world as well, like the audio recordings, and these elements are also converted into a digital equivalent.

Here however, instead of recording sound frequencies, cameras are recording brightness and color information that the camera lens is pointed at and that the light-sensitive sensor "sees." In fact, the light-sensitive sensor in the camera is already cut up into a grid and each part of the grid passes on the information it receives about brightness and color to create a series of bitmap images containing a digital equivalent of what the camera was pointed at.

The concept of bit depth that we learned about regarding digital images also directly applies to all those individual frames of video.

While 8 bits gives you only 256 colors, both photos and video use 8-bit color depth ***per channel*** of color. Digital video generally record color and brightness information in an additive color system called RGB, where the name comes from the primary color channels Red, Green, Blue. Thus you end up with 24bit video (3 x 8 bit) which in all the three-color variations allows video (or photos) to work with almost 17million colors. That should work for now.

A good way to remember this process might be to consider the word "photography." The word "photo" comes from ancient Greek and means "light," where as "graph" or" graphy" refers to "drawing." Thus a photograph is a drawing made of light.
The word video, by the way comes from the Latin verb and means "to see".

So there you go - while there are fundamental differences in how we regard and use audio and music, photos and illustrations, video and movies, the underlying principles of how they end up on a computer are not all that different.

So, with these fundamentals in mind, we'll next take a close look at some of the unique properties of digital video on a computer.