Video Quality and Digital Files

How does Video Quality Affect Digital Files?

Production Techniques

Is “technical” quality the only thing?

Working with Talent
Frame Sample Rates for Uncompressed Video

Full frame = 640 x 480 pixels
640 x 480 x 30 frames per second = 9,216,000 pixels

Each pixel needs 24 bits for color
9,216,000 x 24 = 221,184,000 bits
221,184,000 bits/8 bits/byte = 27,648,000
27,648,000 bytes/1024 bytes/KB = 27,000 KB
27,000 KB/1024 KB/MB = 26.4 MB
26.4 MB per second of video
1.5 GB per minute
Key frames are reference frames that contain information about the whole frame.

Difference Frame contains only information about the current frame that is different from the previous frame.
Key Frames and Movement

Key frame is a reference frame that contains information about the whole frame.

Difference Frame contains only information about the current frame that is different from the previous frame.

More movement makes more difference frames.
What affects does movement have on the digitized video?

- All movement affects the encoding
- Encoders try to minimize movement
  - Inter-frame compression
    - Small areas of movement, such as a mouth on a talking head, are digitized, static areas are not.
  - Motion Detection
    - Moving objects are not digitized each frame, just moved, e.g. a boat moving across the frame.
Some movements cause more problems for encoders

- Busy backgrounds, such as crowds or moving leaves, adds to movement.
- Unsteady cameras adds to movement.
- Zooms, pans and tilts cause more movement.
- Dissolves, wipes and other special effects cause more movement.
- Animated graphics add movement.
Steps to minimize movement

- Use static backgrounds
- Use tripods
- Limit unnecessary camera movement
- Use cuts rather than fancy transition effects
- Static graphics
Noise is any artifact recorded in the video that was not part of the original scene. This often is seen as sparkles, black dots, graininess, blocky spots and fuzziness.

Noise tends to be random and can last on the video for as little as one frame.

The encoder sees noise as movement and encodes more frames.
What adds noise to video?

- **Video Cameras**
  - Old tube cameras add a lot of noise
  - Digital cameras use light sensitive “chips.”
    - Consumer cameras use a single chip, broadcast cameras use three chips.
      - The quality and number of chips will determine how well the camera will record in “low light” settings.
      - The Gain Control helps record in low light, but adds noise.
  - The lens has a big influence on light sensitivity and sharpness of the image.
What adds noise to video?

• Video Tape
  - Still most cost effective storage medium.
  - Quality varies between brands and formats.
  - Analogue formats (VHS, BetacamSP) are more susceptible to noise.
  - Digital formats (DVCam, BetacamSX) maintain the digital quality of the digital video signal.
  - Amount of information recorded on tape affects quality.
    • DVCam records more digital information than MiniDV but less than BetacamSX.
  - Dropouts can affect any tape format.
How to reduce noise

• Use the best camera you can afford.
  ▪ 3 chips and a good lens
• Use a professional grade tape format
  ▪ Use good quality brand video tape
  ▪ Don’t over use the video tape
  ▪ Don’t make multiple generation dubs of tape (more of a problem with analogue formats)
• Use proper lighting techniques to bring lighting level up to camera’s recommended levels.
Does improving the quality only have an effect on the encoding?

Of course not, quality also affects the viewing experience for television as well as for streaming files!
The TV Wasteland Zone
Let’s take a break........