

Digital Video Tips

David Gabbé

What do I do?

- **Interactivity**
 - ◆ **Web to CD-ROM**
 - **Digital Video**
 - ◆ **Digitize analog tape**
 - ◆ **Prepare video for CD-ROM playback**
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What you might do

Applications

- Video tape patients (higher resolution)
 - Archive patient info on CDR
 - Nuclear medicine (lower resolution)
 - Surgical preparation (higher resolution)
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Outline

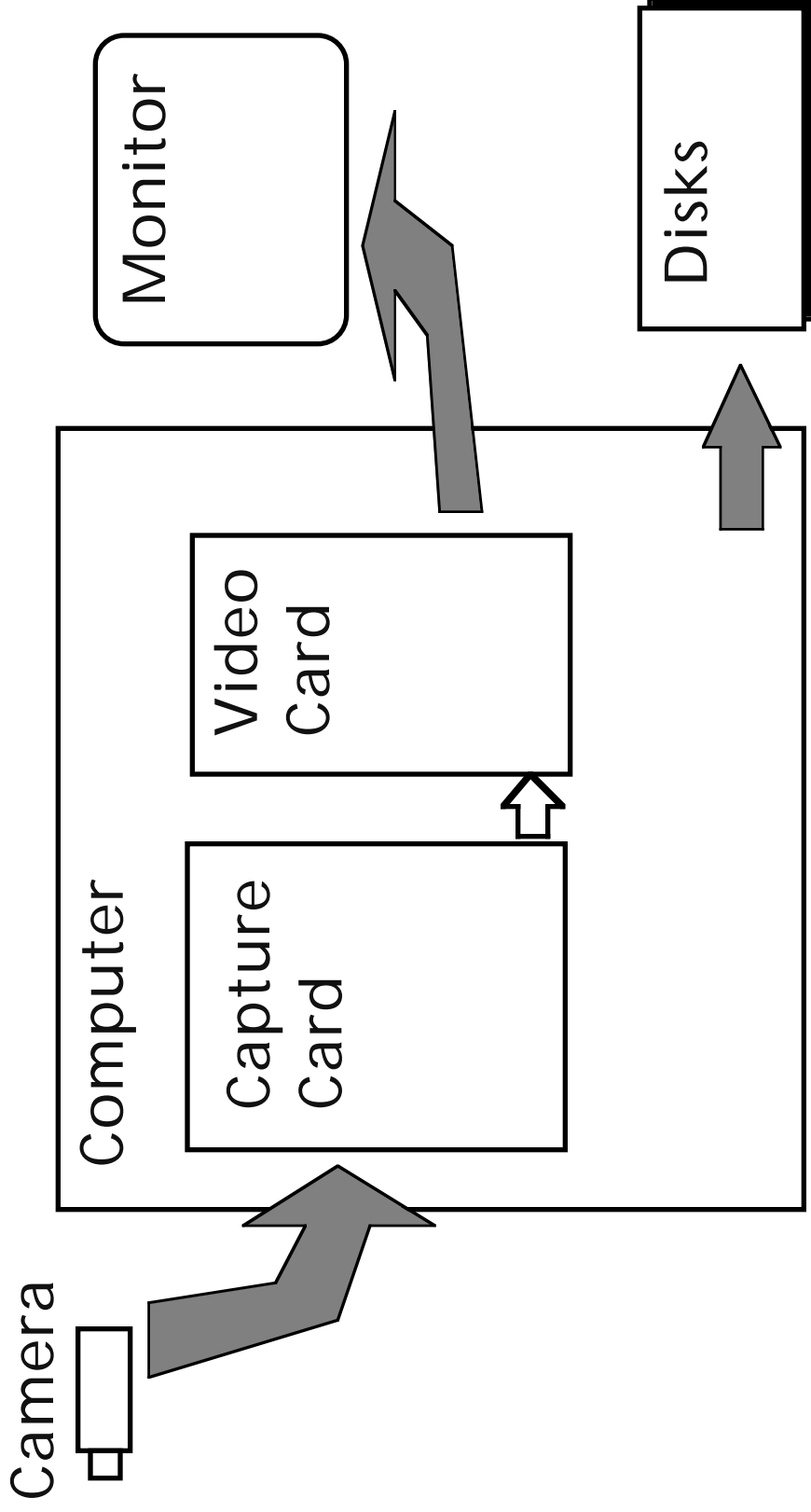
- **Quality**
 - **Codecs: Cinepak & Indeo**
 - **File formats: QuickTime & AVI**
 - **Computer systems: emphasis on disks**
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Video today is hard

Is lossy compression acceptable?

- Operate at maximum limits
 - ◆ CPU
 - ◆ Disks
 - ◆ Graphics (video) card
 - ◆ Digitizing (capture) card
 - Results achieved with lossy compression
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Typical Video Editing System



Quality today

Tape

▶ BetaCam SP

▶ SVHS

▶ Hi8

▶ VHS

Quality today

Digitizing video signal

- Professional: 140 - 200Kb/frame
 - High Quality: 120Kb/frame
 - Lower: icky
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Quality today

Digitizing audio signal

- Professional: 16 bit, 44.1kHz, stereo (CD)
 - High quality: 16 bit, 22.05kHz, stereo
 - Lower: icky
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Quality today

Output

- **Highest quality (full screen, full motion)**
 - ◆ **Video: 640 x 480, 30fps**
 - ◆ **Audio: 16 bit, 44.1kHz, stereo**
 - ◆ **Requires hardware decompression**
 - **Software decompression**
 - ◆ **Video: 320 x 240, 10 - 15fps**
 - ◆ **Audio: 8 - 16 bit, 11 - 22kHz, mono**
 - ◆ **Data rate: 150 - 500 Kb/sec**
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Quality tomorrow

Remember Moore's Law

- **Input: Digital signal from camera**
 - **Output: Full screen, full motion, MPEG2**
 - **Audio: Compression**
 - **Disks: Faster, larger, & new interconnects**
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The process

- **Output medium governs digitizing quality**
 - **Disk subsystem determines if digitizing quality settings are achievable**
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The assignment

- **Upper body shot - 320 x 240**
 - **Lip synch important**
 - **Playback from 2x CD-ROM**
 - **Playback on Mac or PC**
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Codecs

Part 1

- Cinepak or Indeo 3.22
 - Intraframe compression (spacial)
 - Interframe compression (temporal)
 - Input signal noise causes
 - ◆ Annoying artifacts
 - ◆ Lower compression
 - Compression time ~20:1
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Codecs

Tips for filming

- **Quiet background**
 - ◆ No clutter
 - ◆ Consider chroma key green background
 - **No dim scenes - no detail in shadows**
 - **Shot with a tripod**
 - **Avoid high motion scenes**
 - ◆ Single frame cuts
 - ◆ High velocity objects
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Codecs

Cinepak vs. Indeo

- **Cinepak good for:**
 - ◆ High motion
 - ◆ Data rate under 200Kb/sec
 - **Indeo good for:**
 - ◆ Talking heads
 - ◆ Data rates over 200Kb/sec
 - **Always do a test CD-ROM**
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Codecs

Dialog box data rate confusion

- Video portion only
 - Suggestion only - check actual data rate
 - Overrides all other quality settings
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File formats

QuickTime vs. AVI

- QuickTime is cross platform
 - AVI does not keep lip synch
 - AVI must interleave video & audio tracks
 - Mac & PC have different gamma functions
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Audio

General problems

- Removes bandwidth from video
 - Must digitize with input levels properly set
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Audio

Sampling details

- **Space requirements are:**
 - ◆ Channels * Sample size * sample rate
 - **Favor sample size over sample rate**
 - ◆ 16 bit, 11kHz over 8 bit, 22kHz
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Pitfalls to avoid

- **Cinepak movie dimensions multiple of 4**
 - **Compress only once!**
 - **Cross platform sampling rates**
 - ◆ 11.025kHz, 22.050kHz, 44.1kHz
 - **QuickTime Mac movies**
 - ◆ Flatten movie (self contained)
 - ◆ Cross platform (Resource fork into data fork)
 - ◆ QuickTime 2.1 changed file format
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The assignment continued

Application of technical information

- **Data rate limit is 300Kb/sec**
 - **Audio: 16 bit, 11kHz, mono (22Kb/sec)**
 - **Video: 200Kb/sec - Try Cinepak first**
 - **Digitize at 150Kb/frame**
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Computer systems

Graphics card

- Performance penalty with monitor and movie color depth mismatch
 - Video card driver affects performance!
 - Video cards good a some tasks and not others
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Computer system

Disk drives

- Sustained transfer rates of 4.5Mb/sec for 150Kb/frame (30fps)
 - Thermal recalibration causes dropped frames
 - Turn off error checking in drive firmware
 - PCI, SCSI-2 does the job now
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Computer system

Disk drives continued

- Store only video files on AV drives
- Choose NTFS over FAT partitions on

WindowsNT

- Dual SCSI controllers makes big difference
 - Use WindowsNT built-in striping capability
 - Use SCSI wide for more performance
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 - ◆ Update will have reference section
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