Camera, video production TNGD10 - Moving media

Parallel vs serial information

- Film and projector is parallel information
- But, to distribute film you need serial information
- You achieve this by dividing the image in parallel lines with varying intensity.
- These lines is then possible to transmit serially

Scanning - interlaced

- Reduce bandwidth
- Divides an image in odd and even lines
- Updates odd lines first then even lines, 25/30fps -> 50/60Hz



Scanning - interlaced

- Reduce bandwidth
- Divides an image in odd and even lines
- Updates odd lines first then even lines, 25/30fps -> 50/60Hz
- Delay between odd and even lines



Scanning - interlaced

- Reduce bandwidth
- Divides an image in odd and even lines
- Updates odd lines first then even lines, 25/30fps -> 50/60Hz
- Delay between odd
- Deinterlacing



Ce-interlacing

Scanning - progressive

- Every line is scanned in order, from top and downwards
- More stable image, 50/60Hz
- More details
- More bandwidth



Video formats

- PAL 25 images/second (fps/Hz) NTSC – 30 images/second
 Film – 24 images/second
- SD PAL analogue 4:3 768x576 ("real" 4:3)
 SD PAL digital 4:3 720x576 (non square pixels)
 SD PAL digital 16:9 720x576 (non square pixels)
 HD 720p 16:9 1280x720 ("real" 16:9)
 HD 1080i 16:9 1920x1080 ("real" 16:9)
 HD 1080p 16:9 1920x1080 ("real" 16:9)
- 2160p/4K 3840x2160
 4320p/8K 7680x4320

Frame rates

- Which one to use?
- Which looks best?
- "24p just looks more like film"
- Problem when using different frame rates
 - Either skip frames (images) in the faster fr
 - Or "invent" or repeat frames (images) in the slower fr

- A semiconductor component, CCD or CMOS
- The size of the pixels plus the resolution



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- Green color most luminance



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- The eye perception of sharpness is in the gray scale



- A semiconductor component, CCD or CMOS
- The size of the pixels plus the resolution
- Green color most luminance
- The eye perception of sha
- Elongation factor



Video - subsampling

- Chroma subsampling reduces the resolution for the color component
- The eye is less sensible to position and movement in color than in the grey scale

Video - subsampling



YUV 4:4:4 HQ
 YUV 4:2:2 full quality video
 YUV 4:2:0 PAL DV / DVCAM
 YUV 4:1:1 DVCPRO
 RGB 4:4:4 computer graphics
 RGB 4:4:4:4 computer graphics with alpha channel

Colors

Additive or subtractive



Image sensor vs the eye

- The three sensors' sensitivity peaks located at specific wavelengths
- The eye wavelengths





Colors - RGB vs YUV

RGB

Red

Green

Blue





YUV

Y - grey

U - Blue

V - Red

Light

ISO = light sensitivity of the photographic film

100	125	160	200	250
320	400	500	640	800
1000	1250	1600	2000	2500
3200	4000	5000	6400	12300

Light

ISO = light sensitivity of the photographic film



Light

- ISO = light sensitivity of the photographic film
- Poor lighting = higher ISO = more nosie



Color temperature

- Kelvin
- White > 7000K
- Red/orange ~2000K
- White balancing



White balancing

- Automatic vs manual
- Use RAW
- Reference paper
- Artistic reasons...







- For normal light source, the light has no particular polarization
- A reflection on a dielectric surface
- The light from a blue sky
- Polarizer transmits light from one direction



For normal light source, the light has no particular



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For normal light source, the light has no particular



Light metering

- Measurement of incident light direct light metering
- Measurement of reflected light indirect light measurement
- Built-in camera & stand alone



Dynamic range

- Contrast / dynamic range
- Appears in the histogram
- Flash / reflectors to light up dark areas
- Gradient filter
- Take two
 photos and
 edit



Exposure

- Light vs darkness
- The exposure is determined by:
 - Object brightness
 - Shutter speed
 - Aperture size
- Contrast ratio
- Over- and underexposure



Aperture

- The aperture lets in light to the sensor
- Without light no image (no exposure)
- The size of the opening may be varied
- The exposure time needs to be adjusted
- The aperture affects depth of field
- Lower aperture value larger opening



Aperture size



- Aperture size
- Distance between camera an object



- Aperture size
- Distance between camera an object
- Focal length



Camera sensor size

- Small sensor = longer focal length
- Larger sensor = reduced depth of field





Data compression

- RGB to YUV
- Spatial compression, the difference between pixels in the image
- Temporal compression, the difference between pixels in difference frames
- Frame rate

Data compression

Spatial and temporal compression



Rendering

- After completed editing work the movie is rendered to a file
- Compression, file format, resolution
- Loss of quality
- mpeg, avi, m4v ...
- 360 / 480, 720p, 1080i ...
- Generation loss
- Format: H.264, Preset: HD 1080p, Image format: 16:9