Video Production

Lecture 17

Video Basics

- Most video system are “low quality”
- Current TV/Video system are analogue.
- From the point of origin signals are constantly degraded/modified as they pass through different systems until finally appearing as glowing dots on a screen.
- Note: We are not dealing with computer projectors here.

Video Basics…

- TV/Video systems have limited bandwidth (few MHz) which limits:
  - spatial resolution
  - colour resolution
  - temporal stability
- TV/Video equipment tolerances limit the above as well as viewable picture area.

Analogue vs Digital

- Analogue signals use continuously variable values (eg voltage, magnetic field strength) to encode information.
- Analogue signals are susceptible to degredation during storage and transmission.
- Digital data (in its simplest form) is bi-stable and hence more tolerant to noise and interference.

Video Format Standards

Analogue "Quality" Standards (note: not encoding format standards)

- Betacam — Broadcast Quality
- Hi-8 — Pseudo Professional
- Beta (obsolete) — Half decent consumer standard
- Super VHS — Almost half-decent
- VHS — Very Horrible Signal
- (Long play VHS) — OK for soapies.

TV Picture Tube

- Simple/Primitive Technology
  - "Red", "Green", "Blue" electron guns.
  - Shadow mask.
  - Red, Green, Blue Phosphor dots
  - Magnetic Deflection coils.
- Images are made by scanning an electron beam from left to right, starting at the top and progressing line by line to the bottom of the screen. Repeat ad infinitum.

Computer Monitors

- But computer monitors have good pictures…
  - Much higher cost for a given screen quality and input signal is far superior quality.
  - Non interlaced
  - High refresh rates (not same as fps but close enough for a simple approach)
- You can't trivially compare TV systems and computer monitors.

Moving Pictures

- Moving picture systems display images at a fixed rate.
  - Film: 24 frames per second (fps)
  - TV/Video 25/30 fps (depending on country)

- But it isn't quite that simple in the fine print...

Interlacing

- To make motion smoother and reduce flicker video systems actually display the images at double the quoted frame rate.
- Odd lines are drawn first then the electron beam goes back and draws the even lines.
- Each odd or even set is called a field.
- Fields are drawn at double the frame rate.
- Knowledge of this can be used to create smooth computer animation.

"Resolution"

So what is the resolution of a TV set?

- Well it doesn't deal in pixels so we can't specify a real resolution.
- Interlacing also complicates matters.
- Australian TV sets display 625 scan lines.

PAL, SECAM, NTSC

- Along with video format standards (VHS, Betacam etc) there are also country encoding standards.
- Europe and Australia use a system called PAL.
- America and Japan use a system called NTSC.
- Some countries used a modified PAL system called SECAM.

PAL vs NTSC

- PAL is significantly superior to NTSC.
- NTSC only has 525 lines per frame (vs PALs 625). If you look at a US TV screen you can see the lines very clearly.
- NTSC runs at 30 fps, PAL uses 25 fps.
- NTSC also has problems with colour consistency. NTSC's nickname is "Never Twice the Same Colour"

"Resolution" …

- In practice the PAL results in an effective "TV resolution" of 720 pixels wide by 576 high.
- Technical subtleties make other values are possible (eg 768 x 576)

So I need to create images that are 720 x 576?

- Yes but…

Drawing inside the Lines

- You can't use all of the 720 x 576 pixels.

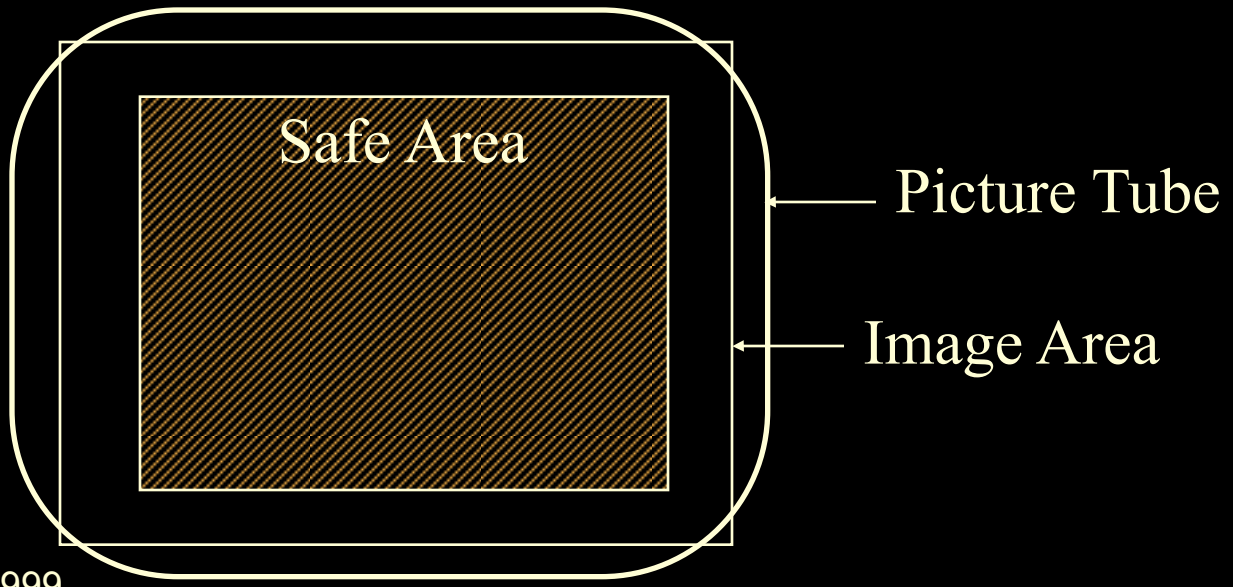
Why not ?

- TV sets and video system vary in their manufacturing tolerances. You can't guarantee that a line drawn around the edge for example will be seen on every TV set.

So what can we guarantee?

Safe Area

- Videos have a “safe area”
- The lowest common denominator viewable area
- The safe area is around 75% in each direction
- Keep all important detail within this region



WYSINWYTYD

- What You See Is Not What You Thought You'd Get!

Size is Everything

- Even though the resolution is nominally 720x576, don't rely on seeing pixel level detail.
- Often detail will be too fuzzy due to bandwidth and interlace timing limitations.
- Keep detail simpler than you would on an equivalent Computer Screen.
- Eg Do not expect to see a 640x480 PC screenshot really clearly on a TV screen.

Thin Lines

- Thin lines are a particular problem. Indeed thin lines (especially horizontal ones) often disappear totally or flicker badly.
- Computer graphics images must either use line >1 pixel wide or preprocess each image to thicken all lines.

The Fine Print

- Text font size is very important.
- This text is being displayed on a digital projector which is superior to a TV system.
- Even with better technology font size is limited by audience size.
- 28 Point Text
- 24 Point Text
- 20 Point Text
- 16 Point Text
- 12 Point Text
- 10 Point Text. How long is a piece of string ?

Colouring In

- Not all colours can be displayed in a TV/ Video system.
- Best rule is to avoid really bright (fully saturated colours).
- Bright red is really really bad. It leads to an effect called colour bleeding.
- Bright white causes a similar problem called blooming.
- Soft pastels are good.

Colour Shifting

- In much the same way as colours appear different on paper prints compared to the computer screen, colours will appear different on TV screens.
- Indeed every TV has a colour control which significantly affects the image.
- Even identical “reference monitors” display colours differently.
- Rule: Try out a colour (combination) first.

Summary

- Keep important information well away from screen edge.
- Don’t reply on seeing pixel level detail.
- Use thick lines (>1 pixel wide)
- Use pastel (soft) colours
- Keep text large (around 30pt)
- Run a test shot and display on a TV first.

End

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