

Matching Visual Elements

CS5245 Vision & Graphics for Special Effects

Leow Wee Kheng

Department of Computer Science
School of Computing
National University of Singapore

Introduction

What's wrong with this special effect?



To blend real/CG visual elements seamlessly, need to match these:

- **Scale**

- Visual elements should have the same scale.
- Apparent size is related to scale and distance from camera.
- Can be handled during **live shooting** and **compositing**.

- **Camera View**

- Visual elements should be viewed from the same angle.
- Match camera's internal parameters, position, orientation.
- If camera moves, then need to perform **matchmoving**.

- **Object Motion**

- Visual elements should interact seamlessly.
- Need to match objects' motion.
- Need to perform **object tracking** of real objects.
- Poor example: *Looney Tune 2*
- Good example: *The Lord of the Ring: The Two Towers*

- **Illumination**

- Visual elements should be illuminated by the same light.
- Visual elements should cast similar shadows.
- Match light source's type, intensity, position, orientation.
- If light moves (e.g., car's head light), need to match light's motion.

- **Color**

- Visual elements should have matching color tone.
- Can be handled as part of **illumination matching**.
- Can also be handled by **color grading**.

Matching Scale

Scale matching is used

- to match size of CG and real objects,
- to give the illusion of difference in size.

Example: *Jurassic Park* (1993): T-rex is larger than cars.



King Kong (2005): King Kong is much larger than human.



The Lord of the Rings: Different races have difference sizes.



Many techniques are available:

- big rigs
- scale double
- scale compositing
- forced perspective

Big Rigs

- Put stunt person on stilts.
- Dress them up with over-sized costume, false hands, etc.
- Good for interacting with real actors of different size.

Example: From [3]



From [3]



Scale Doubles

- Get very short or tall actors as doubles.
- Dress them up with face masks and wigs.
- Good when facial features are not clearly seen.

Example: From [3]



Scale Compositing

- Shoot two actors at different scales.
- Then, composite them into one footage.
- Good when there is no intricate interactions between actors.

Example: From [3]



Example: From [3]



Forced Perspective

- Put actor of smaller height further from camera.
- Good when there is no intricate interactions between actors.

Example: From [3]



Forced Perspective with Moving Camera

- Forced perspective is easy with stationary camera.
- With moving camera, need to move camera **and** set to get consistent perspective.



Demo: **Forced perspective** [3]

Matching Illumination

Illumination matching

- Match virtual light source to real light source.
- Match light source's type, intensity, position, orientation.
- Illuminate CG objects in the same way as real objects.
- Produce virtual shadows consistent with real shadows.
- If light moves (e.g., car's head light), need to match light's motion.
- If camera moves, need to match camera's motion.

Basic ideas:

- Place reference object in scene.
- Shoot live footage with reference object.
- Use images of reference object as guide to configure virtual lights.





Demo: Matching illumination [3]

Color Grading

Color is a powerful tool for conveying mood [1, 2]:



hot, unbearable



calm, peaceful



bright, lively

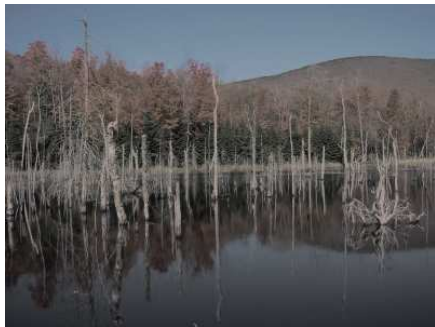


dark, gloomy

Can depict different mood by changing color/tone of image:



bright sunny day



dark gloomy day

So, color manipulation is very important.

Digital color grading

- Use digital hardware/software tool to enhance images.
- Can change intensity, color, contrast.
- Can change highlight part of image, change shadow.

Digital color grading is used to

- provide consistency across multiple live footages,
- match intensity and color of live footages and CG elements,
- depict emotional mood.

Example: From [3]: Enhance color saturation.



Example: From [3]: Depict fairy-like quality.



Example: From [3]: Depict ancient/historical look.



Example: From [3]: Depict warm feeling.



Example: From *Hunter Hunted* (2007): Depict eerie look of *Matrix*.



Example: From [3]: Highlight local region.






Demo [3]

Summary

To blend real and CG visual elements seamlessly, need to

- match scale
- matchmove (match camera motion)
- track object motion
- match illumination
- match color

References

-  Colors and Moods, iit.bloomu.edu/vthc/design/psychology.htm.
-  Color 101, www.keidel.com/resource/wellness/color101.htm.
-  The Lord of the Rings DVD, The Appendices, Part 2: From Vision to Reality.