CS-174A Discussion 1C, Week 10

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@ Discussion 1C Github: https://github.com/NoctisZ/CS174A-1C-2020Fall (https://github.com/NoctisZ/CS174A-1C-2020Fall)

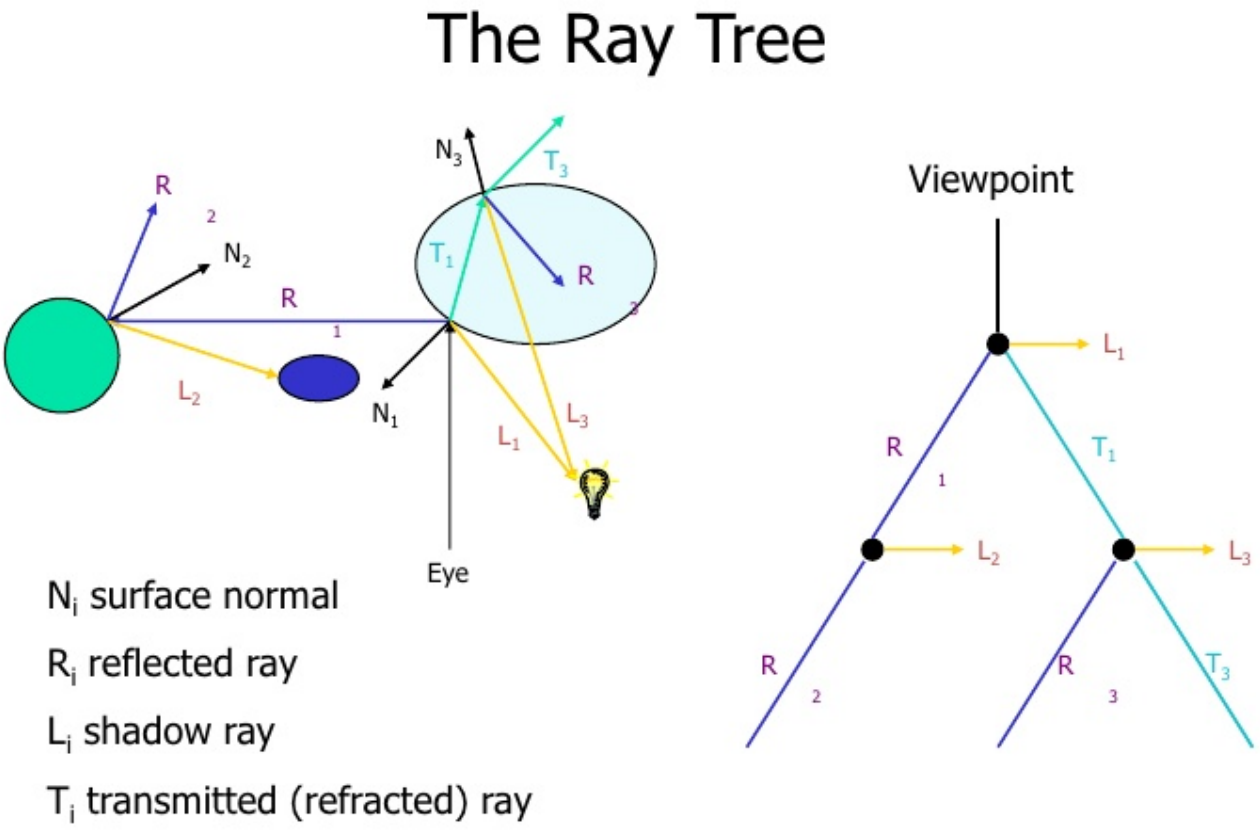
Outline

- Group Project Final Demo
- Extra Topics
- Epilogue

Group Project Final Demo

Extra Topics

Ray Tree



Exercise: if we have a ray tree with 1 R and 1 T branches, with colors R = (0.1,0.2,0.1), T = (0.2,0.0,0.1), Kr = 0.4 (Kr is reflection coefficient), Kt = 0.2 (Kt is transmittion coefficient), and P = (0.0,0.2,0.1) (P is the color of intersection point); what is the color of the pixel?

- Color of pixel = $P + Kr * R + Kt * T$, for each color component
- What if we have more branches?

Answer:

- Compute for each color (RGB), e.g., $Red = P + Kr * R + Kt * T = 0.0 + 0.1 * 0.4 + 0.2 * 0.2 = 0.08$
- If have more branches, just evaluate colors of each intersection from a bottom-up manner

Pre-multiplied compositing color

Exercise: At a particular pixel, below are pre-multiplied colors and depth of 2 particles. Find the effective composited color (RGBA) in the following two cases:

- Particle 1 color: (0.1, 0.2, 0.0, 0.2), Depth: 1.0
  Particle 2 color: (0.1, 0.0, 0.1, 0.4), Depth: 2.0
- Particle 1 color: (0.0, 0.1, 0.2, 0.5), Depth: 2.0
  Particle 2 color: (0.1, 0.3, 0.0, 1.0), Depth: 1.0

Answer:

- Since $Depth_{P1} < Depth_{P2}$, particle 1 is at front, we compute color of the pixel this way:
  $Red = C_f + C_b * (1 - \alpha_f) = 0.1 + 0.1 * (1 - 0.2) = 0.18$
  $Green = C_f + C_b * (1 - \alpha_f) = 0.2 + 0.0 * (1 - 0.2) = 0.2$
  $Blue = C_f + C_b * (1 - \alpha_f) = 0.0 + 0.1 * (1 - 0.2) = 0.08$
  $Alpha = \alpha_f + \alpha_b * (1 - \alpha_f) = 0.2 + 0.4 * (1 - 0.2) = 0.52$

- Since Particle 2 is at front ($Depth_{P2} < Depth_{P1}$) and its opacity (α) value is 1.0, nothing behind it will be visible. Thus the color of the pixel is: $RGBA_{pixel} = RGBA_{P2} = (0.1, 0.3, 0.0, 1.0)$

Epilogue

- **Group project** code due on 12/13, submit via Github
- No need to write a report separately, just describe your design and function in a README file
- **Final exam** will be at 6:00 - 8:30 PM PST on 12/17 (Thursday), on Zoom.

Thank you!