CSE 167 (FA21) Computer Graphics: Non-photorealistic Rendering

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Non-photorealistic rendering

- Most rendering seeks to emulate real world
- However, not all uses of computer graphics call for realism

Technical illustration  Artistic hatching  Cartoon / Celluloid animation
Celluloid (Cel) Animation

- First, draw each frame on paper
- Transfer the outline to transparent sheets (called cels)
- Paint the color on the opposite side of the cel
- Overlay the cell on painted static background
Toon shading / cel shading

• Give 3D scene a cartoon-style look
• Main feature
  ▶ Emphasize silhouettes (outlines)
  ▶ Piecewise constant colors (discretized diffuse + highlights)
Discretized shading

![Discretized shading diagram](image)
Outline techniques

• Direct approach in fragment shader
  
  \[ \text{edge} = \text{true if } \max( n \cdot v, 0) < 0.01 \]
Another technique: post processing

(discretized shading)  Depth map  Normal in the world space

Image processing
edge detection
(Sobel filter)
Another technique: post processing