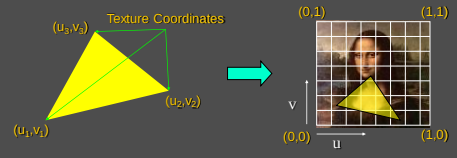
Mapping Techniques

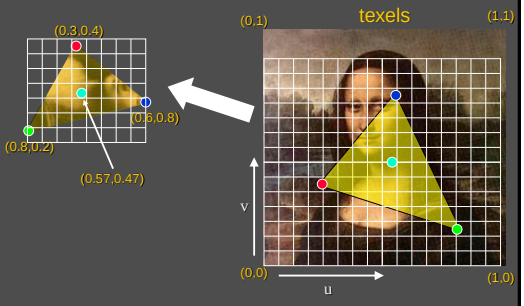
1

Texture Coordinates

- Associates a portion of the texture with a polygon
- Assign texture coordinates to polygon vertices



3



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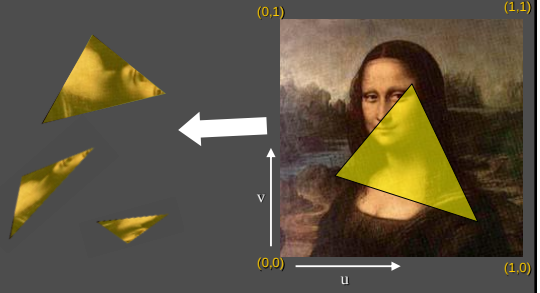

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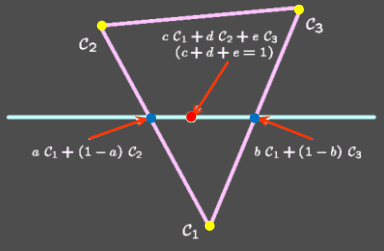
Interpolating Texture Coordinates



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Sampling Schemes

- What is the texture parametric domain?
  - [0,1] x [0,1]
  - So what does it mean to have texture coordinates of (1.1, 2)
  - Clamping vs Repeating


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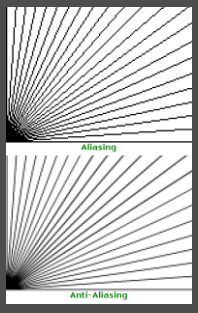
(Anti-)Aliasing



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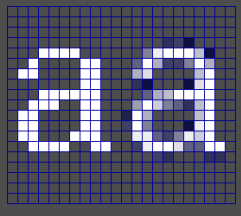

a a

Aliasing

Anti-Aliasing

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(Anti-)Aliasing


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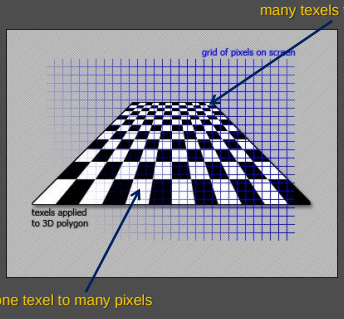
Texture Aliasing



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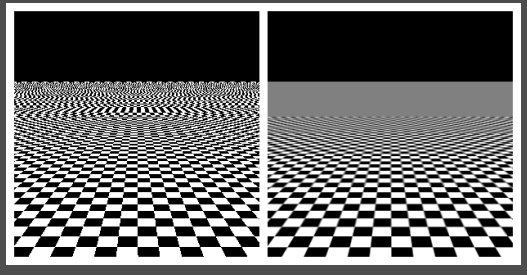

Aliased Anti-aliased

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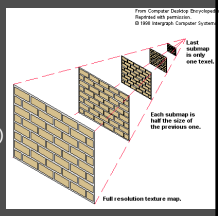
JACOBS TECHNION-CORNELL INSTITUTE AT CORNELL TECH

Sampling Schemes

- Mipmapping
  - MIP – Multum In Parvo
  - "Much in a small space"
- The idea:
  - Store a pyramid of images (a mipmap)
  - Choose a level based on distance
- Trilinear interpolation
  - Interpolate between levels as well



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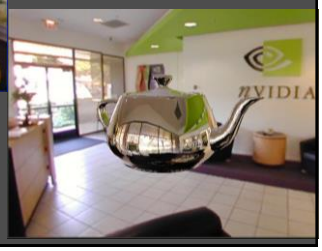
Environment Mapping



Flight of the Navigator 1986

Terminator 2 1991

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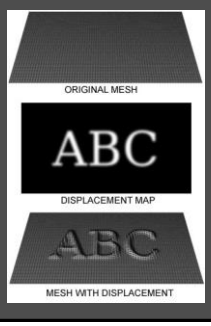
Displacement Mapping

Add "texture" to the surface geometry



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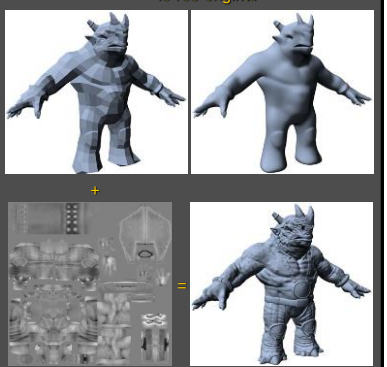
lo-res original

hi-res original



displacement-mapped

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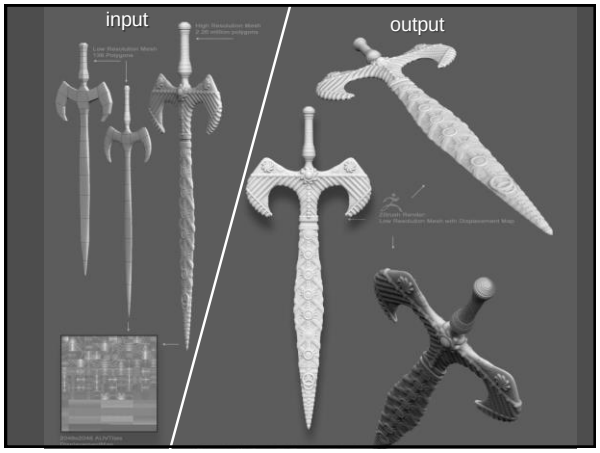
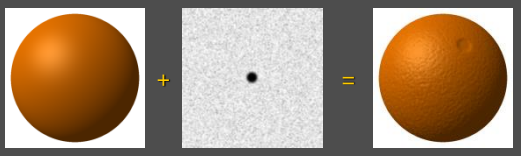
JACOBS TECHNION-CORNELL INSTITUTE AT CORNELL TECH



Normal Mapping

Add "texture" to the surface normals

$$I = I_a k_a + I_p \left(k_d (N \cdot L) + k_s (R_N \cdot V)^n \right)$$



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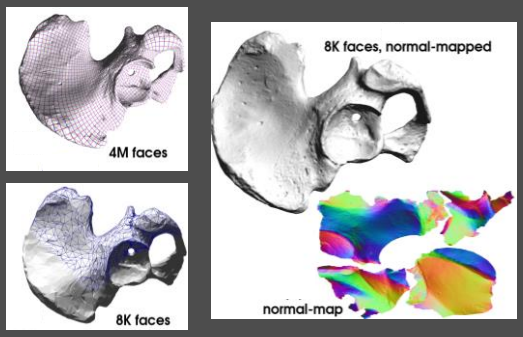
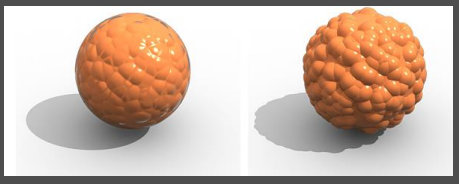
Normal Mapping



Normal vs. Displacement



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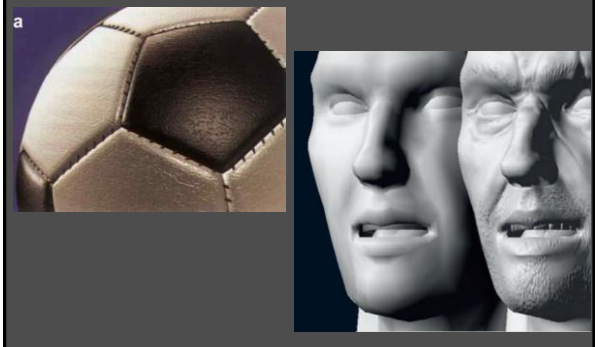
Normal Mapping



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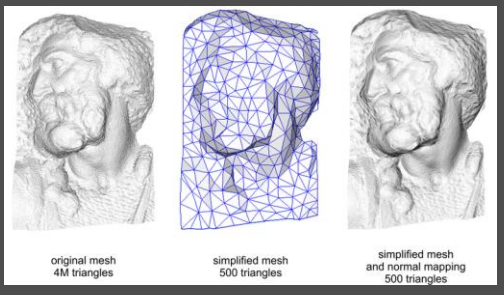
Normal Mapping



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Normal Mapping

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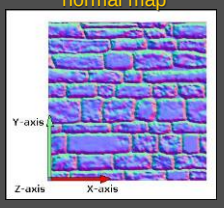
Combined

normal map



Normal + Displacement Mapped | Texture Mapped

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