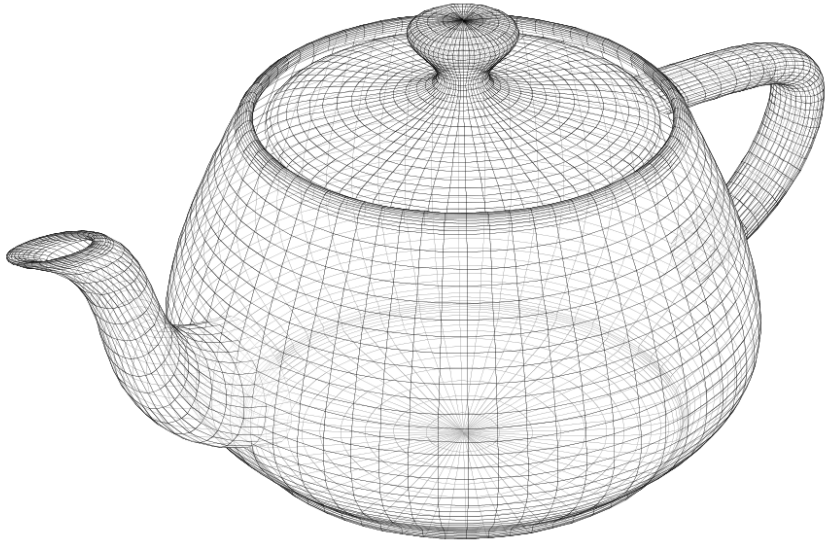

Texture Filtering

Magnification

Interactive Computer Graphics

Professor Eric Shaffer

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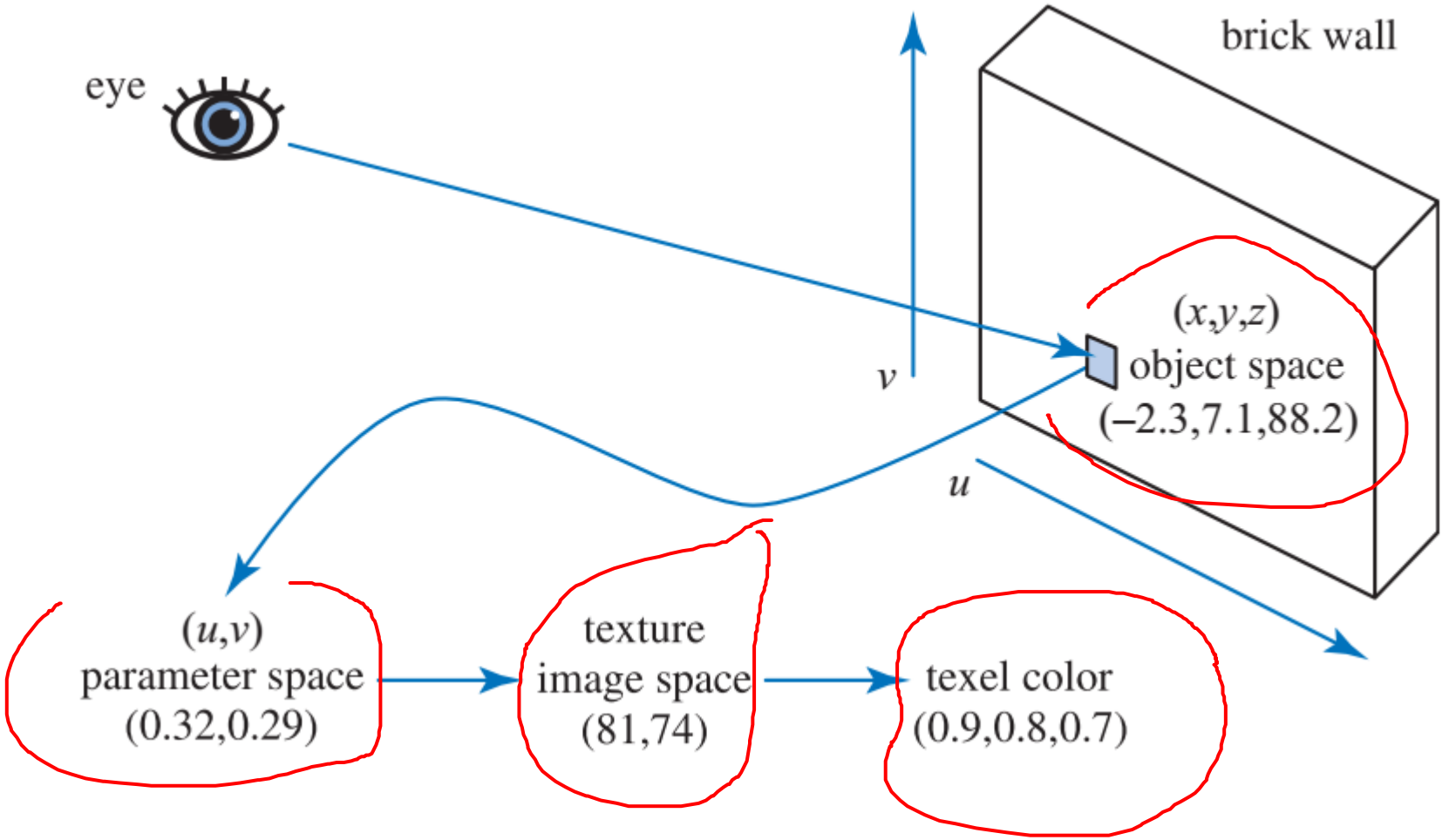
Texture Mapping



Texture Filtering

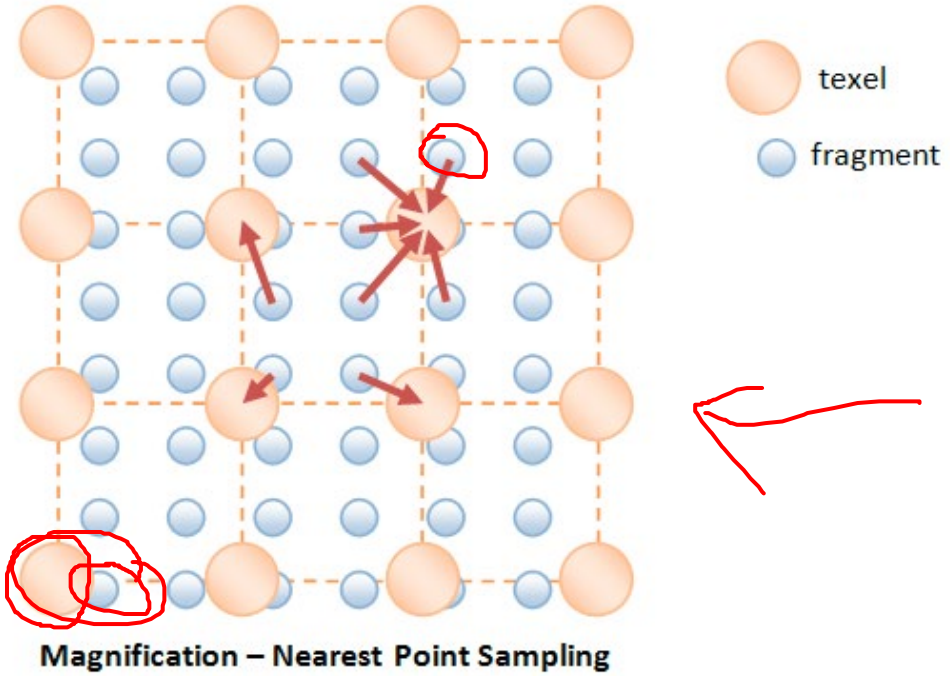
- We often have a mismatch between texture size and number of fragments
  - Requires us to adjust how the texture is sampled…
  - This more complicated sampling process is called ***texture filtering***
- ***Magnification*** occurs when we have more fragments than texels
- ***Minification*** occurs when we have more texels than fragments

- Two common mag filters
  - Nearest Neighbor
  - Bilinear
- Most common min filter
  - Mipmapping

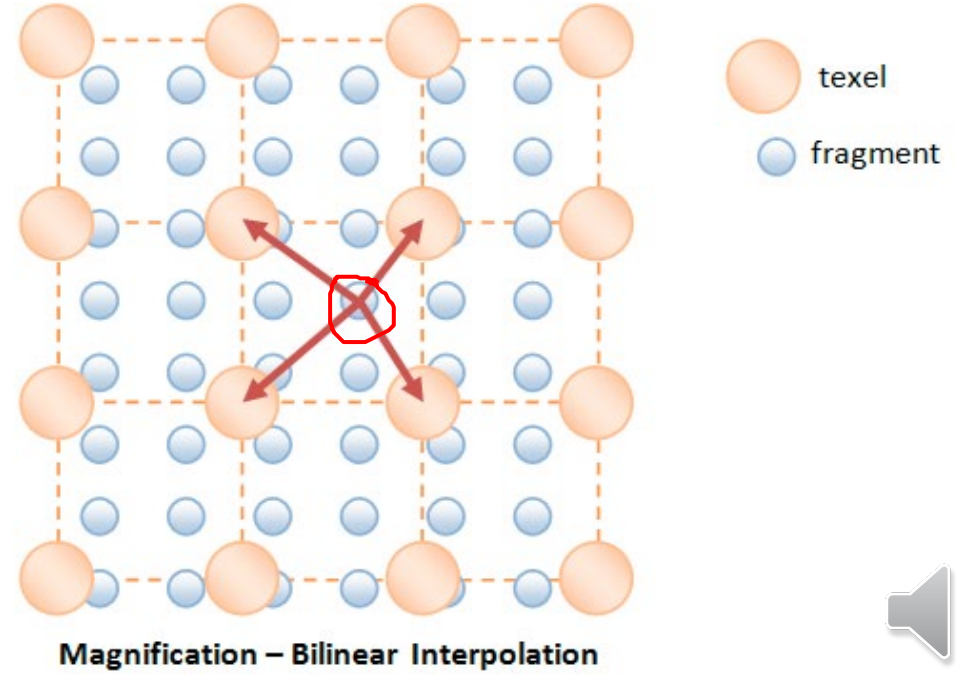
Magnification

Nearest neighbor filtering

Bilinear Interpolation



Magnification – Nearest Point Sampling



Magnification – Bilinear Interpolation

Magnification: Nearest Neighbor

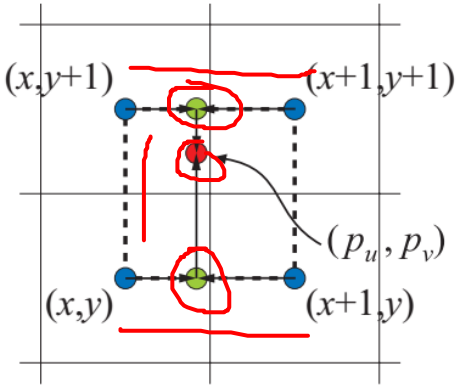
Nearest Neighbor Filtering

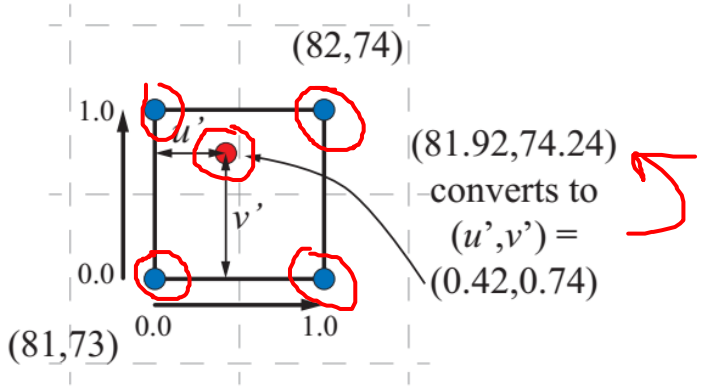
Sample the texel (s,t) given by:

$$s = \text{round}\left((u \times width) - \frac{1}{2}\right)$$

$$t = \text{round}\left((v \times height) - \frac{1}{2}\right)$$

Magnification: Bilinear Interpolation





- In bilinear interpolation, we estimate a value for a function
  - On a 2D grid…with function samples at the grid vertices
- We interpolate first in one direction (e.g. the x direction)
  - Interpolate using linear interpolation twice
  - Find 2 points…one on each edge
- Then interpolate in the other direction (e.g. the y direction)
  - Linear interpolation again
  - Between the two points from the first round of interpolation

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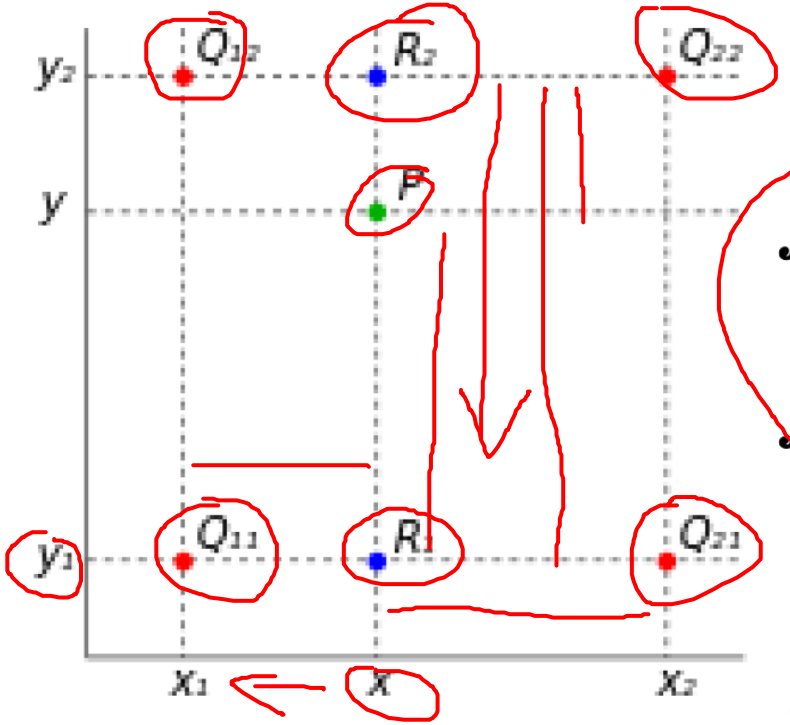
Magnification: Bilinear Interpolation



$$f(x, y_1) \approx \frac{x_2 - x}{x_2 - x_1} f(Q_{11}) + \frac{x - x_1}{x_2 - x_1} f(Q_{21}),$$

$$f(x, y_2) \approx \frac{x_2 - x}{x_2 - x_1} f(Q_{12}) + \frac{x - x_1}{x_2 - x_1} f(Q_{22}).$$

$$f(x, y) \approx \frac{y_2 - y}{y_2 - y_1} f(x, y_1) + \frac{y - y_1}{y_2 - y_1} f(x, y_2)$$

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