COMP30019 Graphics and Interaction Rasterization and Barycentric Coordinates

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Lecture outline

Introduction

So far...

In the last two lectures, we covered the *illumination model* and *shading model*.

The Gouraud and Phong shading were presented from a theoretical standpoint, based on fundamental ideas of

- intensity interpolation, and
- surface normal interpolation

and from the perspective of shading individual pixels.

. . . so far. . .

A number of problems were found to occur with pixel-based interpolation schemes, including

- orientation dependence,
- perspective distortion &
- unrepresentative surface normals.

In practice, more sophisticated interpolation is used by GPU's, **based on fragments**, which overcomes at least some of the problems of more simple interpolation.

In Practice . . .

The *vertex shader* performs interpolation on both pixels and fragments.

- First, the *vertex shader* first interpolates the **corner pixels** at the vertexes on the corner of polygon (e.g. triangle), and
- Second, these corner pixels (parameters) are then handled as **fragments** using a more sophisticated interpolation technique.

See where this fits in the graphic pipeline: `http://www.3dgep.com/introduction-to-directx-11/`

Introduction to Rasterization

Rasterization is the stage of the graphics pipeline that

- first determines the pixels covered by a primitive (e.g. a triangle) and interpolates the output parameters of the *vertex shader* (in particular depth) for each covered pixel; then
- the interpolated output parameters are then given to the *fragment shader*; using
- **barycentric** coordinate system (for more sophisticated interpolation).

See Cg Programming/Rasterization:
`http://en.wikibooks.org/wiki/Cg_Programming/Rasterization`

Rasterization, Visibility & Anti-aliasing

Rasterization involves two additional operations:

- Visibility, and
- Anti-aliasing.

Excellent authority on the subject (slides):
`http://www.doc.ic.ac.uk/~dfg/graphics/graphics2010/GraphicsSlides08.pdf`

by Duncan Gillies, *Imperial College* & Hanspeter Pfister, *Harvard*.

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