A Comparison of Soft Shadowing Algorithms

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Project Description

This will be an investigation into current real-time shadow rendering techniques comparing two triangle-rasterization soft-shadowing techniques to discover which strikes the best balance between speed and image quality for use in next-generation games.

The aim of this project would be primarily to implement and compare two real-time shadow techniques using OpenGL and the OpenGL Shading language, in order to create realistic real-time shadows for games. If time permits, further development would be in implementing further algorithms, or using a more computationally intensive algorithm like ray-tracing instead of approximations in order to see if it is yet a viable real time alternative.

In order to find out which was more applicable, I would have to put the model through a suitable, and preferably automatic testing environment. It would be a simple program displaying something akin to a moving Cornell box, in order to see the soft shadowing at work. Different lighting configurations would be able to show me which algorithm performed the fastest, simulating different scenarios each algorithm may be used in. Artefacting would also be something I would be looking for, but is difficult to quantify, and so I am going to have to devise some form of fair test by which to measure results by.

In order to finish the project, I would have to learn 3D rendering techniques, how to use OpenGL and its shaders. In order to write the program, I will use OpenGL's libraries and will most likely code using Visual Studio 10.

I would like to write the project in C++, as it would give me an excellent grounding in 3D geometric computing and a fuller understanding of renderers and shaders in a language that will be more applicable to that particular job market.

Project Aims and Objectives

Iteration 1
- Make a basic workbench for testing
- Implement a basic stencil shadow shader system.

Iteration 2
- Research and implement algorithm 1
- Research and implement algorithm 2
- Write Interim Report
- Test Algorithm 1
- Test Algorithm 2

Iteration 3
- Adapt the workbench to run a test program for several lighting setups and algorithms
- Write Final Report

Project Deliverables

By the interim report, I expect to have:
- Designed and implemented the first version of my modular virtual workbench for displaying the algorithms.
- A report on my two chosen types of shadowing and why they are relevant, and their basic implementations.

I must implement a virtual workbench for testing the two algorithms, which should be able to:
- Read data to display various objects and lights in a scene
- Display and swap between different shadow types
- Have the ability to display certain criteria about the rendered image.
    - Time per frame in milliseconds
    - Quality of shadows as defined by a particular criteria that I define..

Final Report, which should include:
- The results from my testing - which shadow is better and why?
- Images of scenes and what I learned from the tests - different kinds of artifacting and what causes it.
- Evaluation on what I did and why, and any improvements I could have made.
- Code from the final version of the workbench.