TRENDS IN ALGORITHMS FOR REALISTIC IMAGERY

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ABSTRACT

The last ten years have seen some changes in the importance of various problems associated with the generation of realistic imagery. In 1973 Sutherland et al analyzed a number of extant hidden surface algorithms and convinced the computer graphics community that complex images would require a great deal of attention to sorting strategies. Since then we have learned how to reduce most of the sorting operations for hidden surface elimination to linear cost operations by employing hierarchical sort strategies and utilizing trivial sort operations on simple shapes.

Now the focus has shifted to the expense of generating images with very realistic shading and very high levels of detail. We worry about the expense of anti-aliasing, texturing, and ray-tracing, all of which appear to have irreducibly large costs.

Currently, practical images are simple enough that various tricks can be used to take advantage of regions of low detail. However, future images may be rich enough that brute force techniques will win out over cleverness. As long as images are to be made on general purpose computers, complicated software can be used to achieve greater speed by taking advantage of myriad special cases. However, a much simpler, slower algorithm may be more amenable to easy hardware implementation.

If hardware continues to become simpler to produce, as it is sure to, the simpler algorithms are likely to dominate. Rough attempts to quantify the implementation difficulty and execution time of various graphic algorithms may yield some clues to as to where the efforts of hardware designers are likely to reap the largest rewards.