A FRAMEWORK FOR GLOBAL ILLUMINATION IN ANIMATED ENVIRONMENTS

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We describe a new framework for efficiently computing and storing global illumination effects for complex, animated environments. The new framework allows the rapid generation of sequences representing any arbitrary path in a ``view space'' within an environment in which both the viewer and objects move. The global illumination is stored as time sequences of range images at base locations that span the view space. We present algorithms for determining locations for these base images, and the time steps required to adequately capture the effects of object motion. We also present algorithms for computing the global illumination in the base images that exploit spatial and temporal coherence by considering direct and indirect illumination separately. We discuss an initial implementation using the new framework. Results from our implementation demonstrate the efficient generation of multiple tours through a complex space, and a tour of an environment in which objects move.

Sample Animated Sequences

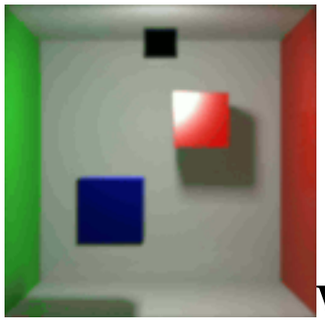
These images and animated sequences illustrate the results obtained by using our new framework.

Walkthroughs in a Complex Environment

These three sequences show walkthroughs in a 75,000 polygon environment. All of the images in the sequences were generated at a resolution of 256x256 pixels by interpolating a set of wide-angle range images. Click here or here for

examples of the 8 base images used for this environment.

- Sequence 1 , moving through the viewspace and looking off toward the windows on the right.
- Sequence 2 , moving through the viewspace and looking off to the left.
- Sequence 3 , through the middle of the view space, looking downward and upward.



Walkthrough in an Animated Environment

This sequence shows a walkthrough of an environment with two moving boxes. A time series of images was computed at each of just two base locations. The indirect solution for all of the base view images were computed by interpolating between just two indirect illumination solutions for the environment -- one in the starting configuration and one in the ending configuration. Click here for the animation. Note the change in the shiny reflections from the boxes as they move relative to the light source. A very simple scheme was used for the time interpolation. Improved morphing between the temporal frames is expected to reduce the fuzziness currently apparent in the sequence.

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