Ray Tracing for Art and Teaching

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Abstract

Ray tracing is a computer graphics rendering technique for generating realistic images for a wide variety of objects and scenes. Mathematical rays are fired from a camera through the computer screen into a scene, and interact with objects in the scene. Usually, one ray is shot per pixel, and an essential element of "recursive" ray tracing is that every time a ray intersects an object in the scene, a reflected ray is generated. This ray is followed recursively through the scene as it reflects off other objects. In addition, when a ray intersects a transparent object, a transmitted ray is also generated at each intersection point, and this ray is also followed recursively through the scene. Ray tracing is a conceptually simple, brute force rendering technique, which is very computationally expensive.

The production of computer art with ray tracing on Macintosh computers is discussed, where the emphasis is on the production of fractal images by the chaotic scattering of light rays off spheres. The general importance of ray tracing as a rendering technique are also discussed, as is its uses for teaching computer graphics. For teaching ray tracing itself, the use of animation sequences is particularly important, and QuickTime movies are used for this.