Hybrid shear-warp rendering

ABSTRACT

Shear-warp rendering is a fast and efficient method for visualizing a volume of sampled data based on a factorization of the viewing transformation into a shear and a warp. In shear-warp rendering, the volume is resampled, composited and warped to obtain the final image. Many applications, however, require a mixture of polygonal and volumetric data to be rendered together in a single image. This paper describes a new approach for extending the shear-warp rendering to simultaneously handle polygonal objects. A data structure, the zlist-buffe, is presented. It is basically a multilayered z-buffer. With the zlist-buffer, an object-based scan conversion of polygons requires only a simple modification of the standard polygon scan-conversion algorithm. This paper shows how the scan conversion can be integrated with shear-warp rendering of run-length encoded volume data to obtain quality images in real time. The utility and performance of the approach using a number of test renderings is also discussed.

Keyword: Volume rendering; Polygon rendering; Shear-warp factorization