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基于GPU的实时深度图像前向映射绘制算法

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Abstract

This paper presents a new pipeline for rendering depth images entirely on GPU (graphics processing unit). The implementation exploits inherent parallelism of GPU to speed up the rendering of depth images. By the scheme, a novel forward 3D warping method is proposed for vertex shader to obtain high rendering performance. Furthermore, the hardware pipeline's rasterization function is utilized to conduct the image re-sampling efficiently to generate holes free rendering results. Per pixel lighting effect is implemented in pixel shader to get high image quality. The rendering shows rapid performance at full screen resolution, with correct self-occlusions and accurate silhouettes. Moreover, a real-time walkthrough system is implemented for the objects based on cylindrical depth image rendered by view-dependent dynamic LOD (level of detail) representation at runtime.

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摘要

提出一种完全基于GPU(graphics processing unit)的实时深度图像绘制流程.该方法利用GPU的并行计算特性对深度图像的绘制过程进行加速.推导出一种在vertex shader上进行的三维前向映射方法,对输入像素进行前向映射,以得到更高的绘制性能,并利用图形硬件流水线的光栅化功能高效地进行图像的插值重构,以得到连续无洞的结果图像.在pixel shader上进行逐像素的光照计算,生成高品质的光照效果.实验表明,该方法可以高速地进行全屏绘制,准确地保留物体轮廓信息和正确的遮挡关系.还实现了基于该方法的实时漫游系统.该系统能够实时地绘制多个基于柱

面深度图像表示的对象,并能对其进行视相关的动态LOD(level of detail)操作.

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