

液晶与显示 2013, (1) 127-131 ISSN: CN:

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成像技术与图像处理

基于GPU的虚拟内窥镜场景实时绘制算法

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摘要: 为满足影像引导手术(IGS)中高分辨率、海量数据的实时渲染,提出一种基于GPU的虚拟内窥镜场景实时绘制算法。该算法针对虚拟内窥镜渲染数据的特点(管腔数据占总数据比例小,5%左右),首先对图像进行自动分割,得到管腔组织的分割数据;仅将分割后的数据一次载入图像显存,利用光线投射算法进行渲染,并在多GPU负载方面做了优化。充分利用GPU渲染和并行计算的能力,实现了海量数据(1 024×1 024×1 024)的实时渲染。

关键词: 虚拟内窥镜 GPU 光线投影 负载均衡

## Real-Time Rendering Algorithm of Scene in Virtual Endoscopy Based on GPU

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Abstract: This paper proposed a real-time rendering algorithm of scene in virtual endoscopy based on GPU which will meet the real-time rendering of high resolution and mass data in the imaging guided surgery (IGS). According to the characteristics of the virtual endoscopy rendering data that the lumen data is only a very small proportion (around 5%) of the total, the first thing to do is to finish the automatic segmentation of image and to get the segmentation data of lumen tissue. Then the divided data is loaded into the image memory once and make the rendering by ray casting algorithm. In addition, the multi-GPU loading is optimized. Finally, the real-time rendering of mass data is realized through the full use of rendering and parallel computing with GPU, such as 1 024×1 024×1 024.

Keywords: virtual endoscopy GPU ray-casting load balancing

收稿日期 2012-11-12 修回日期 2012-12-27 网络版发布日期

基金项目:

通讯作者:

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## 参考文献:

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