Improving the Performance of Volume Rendering For Medical Images

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ABSTRACT: *Volume rendering is a technique for visualizing reconstructed 3D image from a set of 2D images. The main application of volume rendering is in the field of medical imaging. But its use has been limited by its high computational requirement. Early implementations of volume rendering based on CPU used brute-force techniques that require on the order of 100 seconds to render typical data sets. The efficient CPU based rendering techniques such as ray casting have reduced rendering times to the range of 20 seconds but are still not fast enough for interactive visualization applications. In this paper we present a family of volume rendering algorithms that reduces rendering times to one second.*

First we present the mathematical preliminaries of volume rendering. Then go on with various volume rendering techniques. Later discusses about different techniques for fast volume rendering of the 3D medical images on the CPU with out using separate graphics hardware i.e. GPU. Then explains use of GPU based volume rendering. In the later case, the more emphasis on use of GPU based texture mapping for volume rendering of the medical images.

Lastly, we compare the performance of rendering on the CPU and GPU. The GPU based volume rendering is implemented by using C#.Net language and Direct X graphics framework.