Keynote Address

Quo Vadis, VolVis?

Hanspeter Pfister
Mitsubishi Electric Research Laboratories (MERL)

Abstract

The discipline of volume visualization has come a long way. Real-time volume rendering on commodity hardware is now commonplace. Many theoretical aspects of volume modeling and volume visualization have been studied in detail. And the commercial impact of volume visualization is respectable, especially in medical and geophysical applications. Yet, many people share the feeling that the field is becoming stagnant, that too much research focuses on incremental algorithmic improvements, and that we have become disconnected from the scientists, engineers, and doctors who need volume visualization. The question is: where do we go from here?

In this talk I will first take stock of the achievements in volume rendering since 1992, when I attended my first VolVis symposium. I will focus on methods for hardware-accelerated rendering of rectilinear volume datasets: ray casting, texture slicing, shear-warp rendering, and splatting. I will point out which problems could be overcome with progress in technology, and which problems have proven to be fundamentally harder to solve.

The second part of my talk will focus on the future challenges in volume visualization. I will argue that real-time volume rendering is – for all practical purposes – a solved issue. Instead, we need to focus on the principal goal of volume visualization: To convey information with graphical techniques. This simple statement raises many useful questions: How do we convey information effectively? How do we measure effectiveness? What are appropriate forms of visual abstraction? What forms of user interaction are most effective to gain insights? How can technological progress assist us in conveying information more effectively?

I do not to have any clear-cut answers to these questions. Instead, I will demonstrate the issues on some real-life applications and discuss potential areas for further research. My hope is to help foster a better understanding of the challenges ahead, and to provide points of discussion that can assist in making the next big steps in volume visualization.

Bio

Hanspeter Pfister is Associate Director and Senior Research Scientist at MERL – Mitsubishi Electric Research Laboratories – in Cambridge, MA. He is the chief architect of VolumePro, Mitsubishi Electric's real-time volume rendering hardware for PCs. His research interests include computer graphics, computer vision, scientific visualization, and graphics architectures. His work spans a range of topics, including point-based graphics, 3D photography, 3D television, face modeling, face recognition, and volume graphics. Hanspeter Pfister received his Ph.D. in Computer Science in 1996 from the State University of New York at Stony Brook. He received his M.S. in Electrical Engineering from the Swiss Federal Institute of Technology (ETH) Zurich, Switzerland, in 1991. Dr. Pfister has taught courses at major graphics conferences including SIGGRAPH, IEEE Visualization, and Eurographics. He has been teaching introductory and advanced graphics courses at the Harvard Extension School since 1999. He is Associate Editor of the IEEE Transactions on Visualization and Computer Graphics (TVCG), chair of the IEEE Visualization and Graphics Technical Committee (VGTC), and has served as a member of international program committees of major graphics conferences. Dr. Pfister was the general chair of the IEEE Visualization 2002 conference. He is senior member of the IEEE, and member of ACM, ACM SIGGRAPH, the IEEE Computer Society, and the Eurographics Association.