Network Display System for Large Cultural Heritage Objects

via Cloud Computing Environments

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Abstract

Recent advances in sensing and software technologies enable us to obtain large-scale, yet fine 3D mesh models of cultural assets. By using latest laser range sensors specialized for various environments, and sophisticated parallel computing techniques, we can construct high definition 3D models of precious objects easily and quickly. Such archived data can be utilized for many kinds of purposes, such as archaeology, education, and entertainment. However, such large 3D models cannot be accessed interactively from general users through the Internet because of the limitation of the computer performance and network bandwidth. Cloud computing technology is a solution that can process a very large amount of information without adding to each client user's processing cost. In this presentation, we also propose an interactive display system for large 3D mesh models, stored on a remote environment through a network of relatively small capacity machines, based on the cloud computing concept. Our system uses both model- and image-based rendering methods for efficient load balance between a server and clients described in Figure 1. On the server, the 3D models and pre-rendered images are stored, and transferred to the client. On the client, an arbitrary view is constructed by a novel image-based method using both types of data, referred to as the Grid-Lumigraph. The resulting rendering system can efficiently render any images in real time. We implemented the system and evaluated the rendering and data transferring performance.
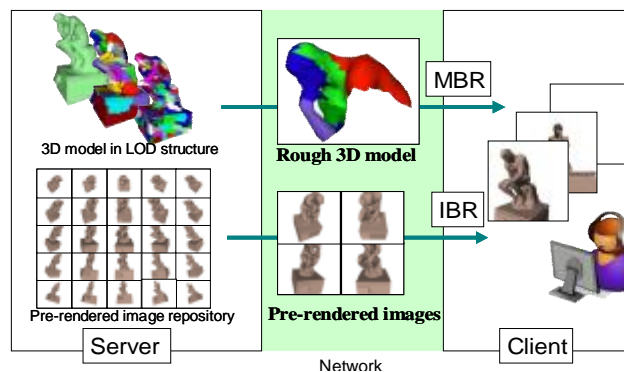
Figure 1: Model- and Image-based Network rendering system