

Tiled displays for presenting high resolution datasets

Paul Bourke
iVEC @ UWA

Introduction

- Viewing geometric datasets that require high resolution to resolve the structure.
- Exploring image data by being able to see detail and the context simultaneously.

Challenges

- All the data can't fit into available memory.
- All the data can't fit into graphics card memory.
- Processing performance precludes realtime interaction of all the data at once.

High resolution display options

- High resolution projector(s).
Issue: High price tag, US\$150K for single 4K projector.
Requires four 4K projectors to achieve 32MPixels.
- Array of projectors. Can create an edge blended seamless display.
Issues:
 - High space requirements.
 - High cost of ownership and maintenance.
Especially for edge blending and colour calibration.
 - High resolution requires a large numbers of projectors.
16 HD projectors required for 32MPixels.
- Tiled LCD panels with small bevels.
Issues: Small bevels are still only exist in relatively low resolution panels.
- Optiportal: possibly large number of displays and multiple computers.
Multiple computers is the only scalable approach.
Issues: Limited software support.

Hardware

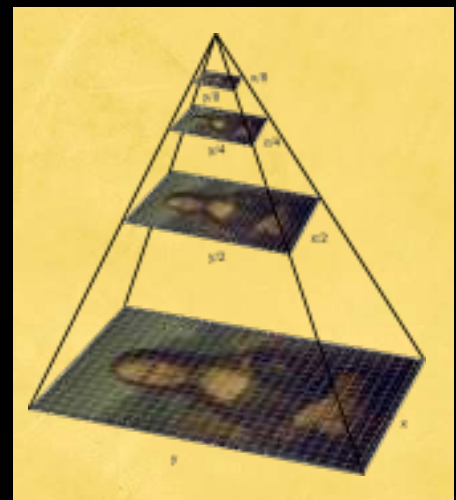
- Claim: To get raw pixel count, the 2560x1600 pixels of 30 inch DELL displays is the most cost effective solution. 8 panels results in 32MPixels.
- Hardware: Single workstation and two nVidia QuadraPlex units.
- QuadraPlex units result in 8 dual link DVI ports, SLI and genlocked if desired.
Based upon the Quadro FX5800 cards.
- Driver support for MSWindows7 and a couple of Linux distributions.
- Has the the major advantage that any software can be used, appears as a single large digital canvas.

Software / data structure

- Brute force algorithms will eventually fail as the data size increases. Especially true for approaches that require all the data to be memory resident.
- Solution is to realise that the display (number of available pixels) limits the data that is visible and therefore limits what needs to be in memory.
- Scalable visualisation software becomes a data management problem.
- Need data structures that allow software to efficiently load just the data that is visible and at the appropriate resolution.
- Data can additionally be located remotely and accessed through client server model. eg: GoogleEarth, iiImage, and others.

Examples

- Google Earth is an obvious example. Data is available in multiple resolution tiles and loaded as required depending on the zoom level.
- Pyramidal tiff image format.
- iiImage: Client server based image viewer.
- vliv: "Very Large Image Viewer", a highly optimised pyramidal tiff viewer.
- DeepZoom from MicroSoft research.
- Challenge is to provide a similar solution for volumetric data.



Demonstration

