THETA

The Higher Education Technology Agenda

Seeing the Big Picture: A Digital Desktop for Researchers

The rapid increase in size of experimental and simulation data requires researchers to rethink the way they interact with data to discover new knowledge. One of the many challenges of big data is how to visualize very large datasets. With sophisticated software, extremely large datasets can be reduced to more understandable graphical summaries. However, these data reduction methods can make it difficult to observe unexpected phenomena at the limit of detectability. In the case of very-high resolution images or image collections, it is beneficial to include a manual inspection stage to support and verify automatic detection algorithms. Tiled Display Walls (TDW) provide a valuable aid for such a process, but due to costs and physical size, have been overlooked by many researchers as a viable option. The recent availability of commodity UltraHD screens offers a cost-effective alternative.. For desktop-based activities that draw data from several sources, having a display that allows all these items to be displayed simultaneously improves cognitive performance.

A second consideration is how to use TDWs or UltraHD screens effectively for remote collaboration. While networks have become increasingly robust and reliable, the bandwidth is not expanding at the same rate as data collection technologies. Local storage often represents a potential single point of failure and traditional local backup methods are no longer as cost effective as online options. Also, many datasets used by modern researchers exceed the capacity of local systems.

Our particular application area of interest is astronomy: where high-resolution images vastly exceeding the resolution of standard displays are generated at a rapid pace from new observational facilities. In this paper we discuss the research underpinning the use of TDWs in astronomical research. We consider UltraHD displays as intermediate options between standard desktop displays and TDWs, and discuss the practicalities of using such displays to enhance the typical desktop environment. Finally we test the capabilities of the Australian Academic Research Network (AARNet) in terms of very large file transfers.. Transfer tests have shown that for files from one gigabyte to one terabyte, the network scales up

approximately linearly, particularly for some parts of the country, such as Canberra to Melbourne, but less so for other places, such as Western Australia to Melbourne. This allows us to put limits on the image size, and interaction speed, for remote collaborative inspection of high-resolution images.

Bernard Meade[1], Christopher Fluke[2], Richard Sinnott[1], Steven Manos[1], Neil Killeen[1], Paul Mignone[1] and Michael Wang[3]

[1]University of Melbourne, [2]Swinburne University of Technology and [3]NVIDIA Corporation

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