Graph Visualization in VR

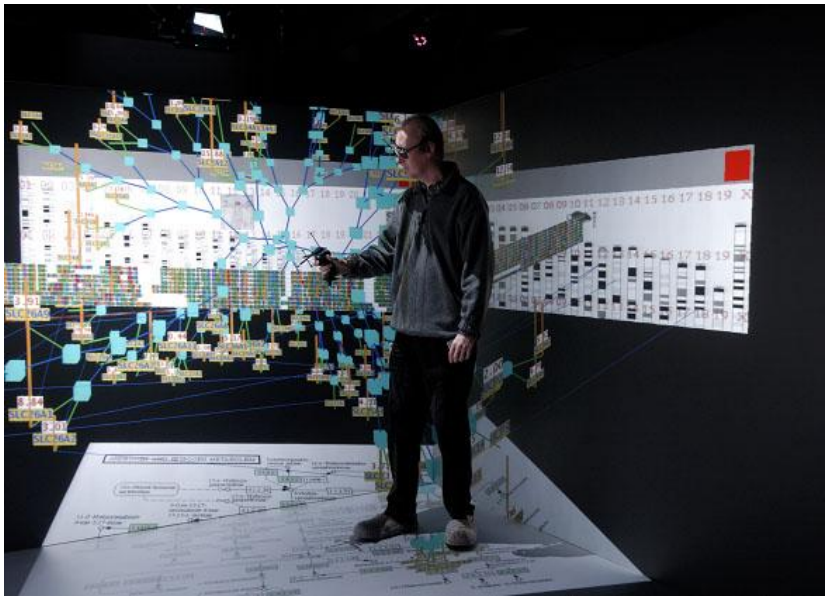
Steve Kim and Jed Tan

Problem Description

2D vs 3D

Interaction + Hardware

Advantages / Disadvantages of VR



Prior Work

Graph Visualization and Navigation in Information Visualization: a Survey

Ivan Herman, Member, IEEE CS Society, Guy Melançon, and M. Scott Marshall

Abstract—This is a survey on graph visualization and navigation techniques, as used in information visualization. Graphs appear in numerous applications such as web browsing, state–transition diagrams, and data structures. The ability to visualize and to navigate in these potentially large, abstract graphs is often a crucial part of an application. Information visualization has specific requirements, which means that this survey approaches the results of traditional graph drawing from a different perspective.

Index Terms—Information visualization, graph visualization, graph drawing, navigation, focus+context, fish–eye, clustering.

1 Introduction

Although the visualization of graphs is the subject of this survey, it is *not* about graph drawing in general. Excellent bibliographic surveys[4],[34], books[5], or even on–line tutorials[26] exist for graph drawing. Instead, the handling of graphs is considered with respect to information visualization.

Information visualization has become a large field and "sub–fields" are beginning to emerge (see for example Card *et al.*[16] for a recent collection of papers from the last decade). A simple way to determine the applicability of graph visualization is to consider the following question: *is there an inherent relation among the data elements to be visualized*? involved in graph visualization: "Where am I?" "Where is the file that I'm looking for?" Other familiar types of graphs include the hierarchy illustrated in an organisational chart and taxonomies that portray the relations between species. Web site maps are another application of graphs as well as browsing history. In biology and chemistry, graphs are applied to evolutionary trees, phylogenetic trees, molecular maps, genetic maps, biochemical pathways, and protein functions. Other areas of application include object–oriented systems (class browsers), data structures (compiler data structures in particular), real–time systems (state–transition diagrams, Petri nets), data flow diagrams, subroutine–call graphs, entity relationship diagrams (e.g. UML and database structures), semantic networks and knowledge–representation

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Automation in Construction

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From CAD to virtual reality: modelling approaches, data exchange and interactive 3D building design tools

J Whyte, N Bouchlaghem[1], A Thorpe, R McCaffer

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Spherical Layout and Rendering Methods for Immersive Graph Visualization

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Abstract

While virtual reality has been researched in many ways for spatial and scientific visualizations, comparatively little has been explored for visualizations of more abstract kinds of data. In particular, stereoscopic and VR environments for graph visualization have only been applied as limited extensions to standard 2D techniques (e.g. using stereoscopy for highlighting). In this work, we explore a new, immersive approach for graph visualization, designed specifically for virtual reality environments.

1 Introduction

Information visualization generally allows for arbitrary mapping of data to the display, allowing for great control over how the data is presented. As such, information visualization approaches traditionally eschew 3D techniques; projecting a 3D visualization onto a 2D display often leads to substantial overplot and clutter issues, which are often avoidable through better 2D representations. However, this limitation only strictly applies to 2D displays. The onset

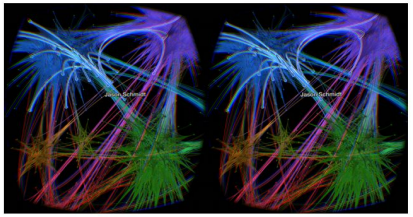

Figure 1: Head Mounted Devices render a warped view with tight control for each eye. Our approach for graph visualization uses techniques targeted specifically for such displays. Color in all figures corresponds to clusters.

Progress

Existing Tools (?)

Hardware Testing

Blueprinting

Change of deliverables

Questions

Ideal Visualization Techniques

Choice of Data

Literature

Points of Interaction