Chapter VIII

Evaluating Graph Drawing Aesthetics: Defining and Exploring a New Empirical Research Area

Helen C. Purchase
University of Glasgow, Scotland

ABSTRACT

This chapter describes a long-term project that investigates the validity of the design principles — not from the perspective of computational efficiency, but from the perspective of human comprehension — upon which many automatic graph layout algorithms are based. It describes a framework for experimentation in this area, the overall methodology used throughout, as well as the details of the experiments themselves. It shows the development of the empirical ideas and methods as the project matured and provides reflections on each experiment, demonstrating the difficulty of initiating a new experimental research area. The chapter suggests how the current results should best be interpreted, as well as ideas for future work in this area.
INTRODUCTION

This chapter describes a long-term project that investigates the validity of the design principles — not from the perspective of computational efficiency, but from the perspective of human comprehension — upon which many automatic graph layout algorithms are based.

There are two main objectives of the chapter:

* to summarise empirical work the author has done on the effectiveness of 2D graph drawing aesthetics; and
* to describe the process of initiating a new experimental research area, developing a framework for empirical studies within the area with specific reference to the experimental methodology and statistical analysis issues involved.

BACKGROUND

A graph is a set of nodes (representing objects) and edges (representing relationships between the objects). Graphs may be represented in diagonal matrices, with each node being associated with both a row and a column and each edge being represented by a positive value in the cell that links two nodes. However, graphs are more typically represented as node-edge diagrams (called graph drawings). Figure 1 represents three different renderings of the same graph structure.

The process of creating a graph drawing from an underlying graph structure is known as automatic graph layout. Many graph layout algorithms exist (Battista et al., 1994) and for many years, researchers have been devising increasingly efficient and elegant algorithms for the production of graph drawings. At the annual Graph Drawing symposium, researchers present their

Figure 1. Three Representations of the Same Graph
Related Content

Aesthetic Expectations for Information Visualization
[www.igi-global.com/article/aesthetic-expectations-information-visualization/41709?camid=4v1a](www.igi-global.com/article/aesthetic-expectations-information-visualization/41709?camid=4v1a)

Aesthetics in the Context of New Media Art and Knowledge Visualization
[www.igi-global.com/chapter/aesthetics-in-the-context-of-new-media-art-and-knowledge-visualization/85384?camid=4v1a](www.igi-global.com/chapter/aesthetics-in-the-context-of-new-media-art-and-knowledge-visualization/85384?camid=4v1a)

On Virtual Fluxus
[www.igi-global.com/chapter/on-virtual-fluxus/138527?camid=4v1a](www.igi-global.com/chapter/on-virtual-fluxus/138527?camid=4v1a)
The Metaplastic Arts and Design Innovations

[www.igi-global.com/article/metaplastic-arts-design-innovations/68390?camid=4v1a](www.igi-global.com/article/metaplastic-arts-design-innovations/68390?camid=4v1a)