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Special Issue on Selected Papers from the Eleventh International Symposium on Graph Drawing, GD 2003

Guest Editor's Foreword

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Introduction

This special issue brings together papers based on work presented at the Eleventh International Symposium on Graph Drawing (GD 2003), which was held September 21-24, 2003, at the University of Perugia, Italy. Preliminary versions of the papers presented at GD 2003 have appeared in the conference proceedings published by Springer-Verlag, Lecture Notes in Computer Science, volume 2912. As editor of this JGAA special issue, I chose to invite papers from GD 2003 that reflect the broad nature of the workshop, which showcase theoretical contributions, experimental work, and system development in the field of graph visualization.

All contributions in this special issue have gone through a rigorous review process. I thank the authors and the referees for their careful work and for their patience and support. I hope that I have captured a bit of the dynamic quality that the range of research interests presented at the workshop imparts.

Scanning the Issue

The issue collects eight papers. The first two papers are contributions to the annual graph drawing contest, whose subject in year 2003 was "Drawing Graphs within Graphs". The remaining six papers cover classical research topics in graph drawing and open new research directions.

The subject of the contest "Drawing Graphs within Graphs" emphasizes the largely open question of how to visualize graph structures that are contained in larger graphs in a distinct way. The contribution by Holleis, Zimmermann, and Gmach, titled "Drawing Graphs within Graphs: A Contribution to the Graph Drawing Contest 2003", presents an approach that emphasizes the relationships between several subgraphs. In a case study, the authors demonstrate how this approach can be used to visualize connections between many small network motifs. Still in the contest category, the paper by Klukas, Koschützki, and Schreiber, titled "Graph Pattern Analysis with *PatternGravisto*," proposes a new method for analyzing graph patterns. The authors implement the method in a tool called *PatternGravisto* whose utility is demonstrated with examples from biology and sociology.

The paper "Confluent Drawings: Visualizing Non-planar Diagrams in a Planar Way", by Dickerson, Eppstein, Goodrich, and Meng introduces a new approach for drawing graphs. The paper describes a technique called *confluent drawing* for visualizing non-planar graphs in a planar way. This approach makes it possible to draw, in a crossing-free manner, graphs—such as software interaction diagrams—that would normally have many crossings.

Bachmaier, Brandenburg, and Forster contributed to this special issue with the paper "Radial Level Planarity Testing and Embedding in Linear Time" that studies the problem of testing the planarity of a graph whose vertices are constrained to lie on concentric circles. They present linear-time algorithms for

radial level planarity testing and for computing a radial level planar embedding that rely on a novel data structure, called *PQR-trees*.

The paper "Characterizing Families of Cuts that can be Represented by Axis-parallel Rectangles", by Brandes, Cornelsen, and Wagner, deals with representing cuts in graphs. A cut of a graph is a partition of its vertex set into two non-empty subsets. In a drawing of a graph it is natural to represent a cut by a closed curve partitioning the plane into two regions containing one subset each. The authors characterize the families of cuts that admit a drawing in which every cut is represented by an axis-parallel rectangle.

Exploring, monitoring, and visualizing the Internet routing at the autonomous system level is the subject of "BGPlay: A System for Visualizing the Interdomain Routing Evolution", by Colitti, Di Battista, Mariani, Patrignani, and Pizzonia. The paper describes the architecture and the visual interface of *BGPlay*, an on-line service for the visualization of the behavior and of the instabilities of Internet routing at the autonomous system level. BGPlay uses ad-hoc techniques and algorithms to display the state of routing at specific points in time and to animate its changes.

Computational results of an implementation based on the fixed parameter tractability approach for biplanarizing graphs are described by Suderman and Whitesides in "Experiments with the Fixed-parameter Approach for Two-Level Planarization". These results show that the implementation can efficiently find minimum biplanarizing sets containing up to about 18 edges, thus making it comparable to previous integer linear programming approaches. They also show how the implementation slightly improves previous theoretical results and explain how the experimental work predicts how performance on sparse graphs may be improved.

The paper "Simultaneous Graph Drawing: Layout Algorithms and Visualization Schemes", by Erten, Kobourov, Le, and Navabi considers the problem of displaying a series of related graphs, i.e., graphs that share all, or parts of the same node set. Besides producing a readable layout of each individual graph, the drawing strategy should maintain the user's mental map when moving from the representation of a graph to the representation of the next graph that has some of its vertices in common with the preceding ones. The authors present three algorithms for simultaneous graph drawing and three visualization schemes. The algorithms and visualization schemes are implemented and the corresponding system is also described in the paper.