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New Trends in Graph Drawing

Special Issue on Selected Papers from the 1997 Symposium on Graph Drawing

Guest Editors' Introduction

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This Special Issue is devoted to selected papers from the 1997 Symposium on Graph Drawing, held in Rome, Italy, on September 18–20, 1997. The Graph Drawing field is a continual source of interesting problems and general methodologies that have both theoretical depth and impact on real-life applications. Among the "hot" topics in the area, we consider the following especially intriguing: (*i*) drawing large graphs by means of clustering techniques, (*ii*) visualizing graphs in 3D, and (*iii*) finding linear-time solutions to problems usually tackled by computationally expensive flow techniques. These topics are addressed in the collection of selected papers of this Special Issue.

Drawing large graphs is important for several applications. A promising approach to the problem is the one of grouping the vertices and the edges into clusters and of allowing the user to visualize the graph selecting her/his favorite "abstraction level". In the selected level, some clusters will be collapsed into single vertices, while some other clusters will be explicitly drawn, with the constraint that the vertices belonging to the same cluster are placed close to each other. Eades, Feng, and Nagamochi propose an algorithm for efficiently constructing clustered drawings with several guarantees on the aesthetic quality of the result.

The problem of constructing orthogonal drawings of plane graphs with the minimum number of bends is usually tackled in terms of a flow problem. Such a method yields algorithms whose time complexity is nonlinear in the number of vertices. Rahman, Nakano, and Nishizeki propose an innovative method that allows to produce in linear time optimal orthogonal drawings for a fairly large class of plane graphs.

Research in 3D graph drawing is attracting increasing attention. In fact, low-price high-performance 3D graphic workstations are becoming widely available. Also, 3D graph drawing offers interesting perspectives to the sophisticated demand of visualization coming from new graphical user interfaces. The paper by Biedl, Shermer, Whitesides, and Wismath studies 3D drawings of graphs with vertices represented by boxes. It proposes new construction methods and offers bounds that can become reference points in the field. The paper by Papakostas and Tollis is based on a realistic interactive setting, where vertices arrive and enter the drawing on-line. The presented algorithms have very good behavior in terms of the volume occupied by the drawing and of the number of bends along the edges.

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