Special Issue with Selected Papers from the 20th International Symposium on Graph Drawing, GD 2012: Guest Editors' Foreword

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This special issue of the Journal of Graph Algorithms and Applications is devoted to the 20th International Symposium on Graph Drawing, which was held in Redmond, Washington, USA, September 19-21, 2012. As the editors of this JGAA special issue, we invited the authors of six of the best papers from GD 2012 to submit a revised and extended version of their work. Each paper submitted to this issue was subject to a thorough reviewing process, and after further revisions all six papers were accepted. We thank all the authors for contributing their high-quality papers and all reviewers for their valuable, excellent, and, in some cases, titanic work.

The six papers in this issue reflect the broad variety of topics in graph drawing, both in theoretical and in application fields. Theoretical papers cover several aspects of graph planarity and its variants, including a unified theory based on Hanani-Tutte's characterization and new results about intersection and contact representations of planar graphs. Application papers address fascinating topics such as the visualization of streaming text data using graphs and maps, algorithms for optical graph recognition, and a new framework for implementing graph algorithms.

- Schaefer studies Hanani-Tutte style theorems for various notions of graph planarity, including partially embedded planarity, simultaneous planarity, upward planarity, and clustered planarity. This approach captures and combines algebraic, combinatorial, and computational aspects of the different variants of planarity, thus providing a uniform foundation for the subject.

- Nöllenburg, Prutkin, and Rutter investigate contact representations of planar graphs with weighted edges: each vertex is represented as a rectangle or a rectilinear polygon, and each edge is represented by a contact between the polygons associated with its end-vertices, where the length of the contact is proportional to the edge weight. For this representation model, they provide characterizations, efficient algorithms, and complexity results under different hypothesis on the combinatorial structure of the input graph.

- Chaplick and Ueckerdt study planar graphs that can be realized as intersection graphs of axis-aligned rectilinear curves. They prove that every planar graph has such a representation where each curve uses at most two bends (i.e., it consists of at most three segments).

- Tantau introduces a new framework for implementing graph drawing algorithms; it aims at letting researchers focus on the implementation part of new algorithmic ideas while takes care of handling the other steps, such as the visual presentation of the computed layout; one interesting feature of this framework is the possibility of directly using the algorithms within the TEX typesetting system.

- Gansner, Hu, and North present a new technique for visualizing and analyzing streaming packets viewed as a dynamic graph; an on-line system

that implements their idea for the visualization of Twitter messages is also described to demonstrate the effectiveness of the proposed approach. The visualization paradigm adopts a geographic map metaphor, where messages concerned with the same topic are grouped together in the same region.

- Auer, Bachmaier, Brandenburg, Gleißner, and Reislhuber study the optical graph recognition problem, that is, how to derive a graph topology from a digital image of the graph. They use image processing techniques and present a prototypical implementation of their approach.

To conclude this foreword we wish to thank the managing editor Giuseppe Liotta and the publication editor Emilio Di Giacomo for their role in making this special issue possible.