



Special Issue on WALCOM 2023: Guest Editors' Foreword

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Introduction

This special issue of the Journal of Graph Algorithms and Applications is dedicated to some of the selected papers from the 17th International Conference and Workshops on Algorithms and Computation (WALCOM 2023). Held in Hsinchu, Taiwan during March 22-24, 2023, with Chun-Cheng Lin, Bertrand M.-T. Lin, and Giuseppe Liotta as Program Co-chairs, WALCOM 2023 brought together researchers and practitioners from around the world to present and discuss the latest advancements in algorithms and computation.

The authors of six selected papers presented at the conference were invited to submit a revised and extended version of their work to this special issue. The submitted papers underwent a rigorous peer-review process, and after thorough revisions, all six were accepted for publication. These papers cover a broad range of topics of interest to the algorithms and computation community, addressing the theoretical aspect. We present the papers in alphabetical order of the last names of the first authors and provide a brief introduction to each.

- ‘Piercing diametral disks induced by edges of maximum spanning trees’ is investigated by A. Karim Abu-Affash, Paz Carmi, and Meytal Maman. They demonstrate that one point is sufficient to pierce all disks in the set of diametral disks induced by the edges of a maximum-weight spanning tree of a set of points in the plane. The authors show that the center of the smallest enclosing circle of the points is contained in all the disks, allowing the piercing point to be computed in linear time.
- ‘Graph burning in community-based networks’ is explored by Gennaro Cordasco, Luisa Gargano, and Adele A. Rescigno. They aim to minimize the number of rounds needed to inform all communities in the network, where a community is satisfied when a specific piece of information reaches at least a prescribed number of its members. The authors provide approximation algorithms and investigate the problem’s complexity for different scenarios.

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- ‘Splitting plane graphs to outerplanarity’ is addressed by Martin Gronemann, Martin Nölenburg, and Anaïs Villedieu. This work tackles the problem of vertex splitting in plane graphs to achieve outerplanarity with a minimum number of splits. The authors establish connections between splitting, finding a connected face cover, and finding a feedback vertex set in the dual graph. They prove NP-completeness for plane biconnected graphs and present polynomial-time algorithms for maximal planar graphs, along with upper and lower bounds for certain families of maximal planar graphs.
- ‘Certifying induced subgraphs in large graphs’ is introduced by Ulrich Meyer, Hung Tran, and Konstantinos Tsakalidis. They propose I/O-efficient certifying algorithms for recognizing several classes of graphs, including bipartite, split, threshold, bipartite chain, and trivially perfect graphs. Their algorithms provide certificates characterizing the graph class or forbidden induced subgraphs for non-membership, achieving efficient I/O performance and demonstrating practical implementations and evaluations.
- ‘Some algorithmic results for eternal vertex cover problem in graphs’ are examined by Kaustav Paul and Arti Pandey. This paper studies the eternal vertex cover problem, where the defender needs to allocate guards at vertices to form a vertex cover and defend against infinite attacks. The authors present polynomial-time algorithms for finding the eternal vertex cover number in chain graphs and P4-sparse graphs, as well as a linear-time algorithm for split graphs.
- ‘Reconfiguration of vertex-disjoint shortest paths on graphs’ is studied by Rin Saito, Hiroshi Eto, Takehiro Ito, and Ryuhei Uehara. They investigate reconfiguration problems for vertex-disjoint shortest paths, aiming to transform one set of disjoint paths into another through vertex exchanges while maintaining disjointedness. The authors analyze the problem’s complexity across different graph classes and propose algorithms for minimizing the number of vertex-exchange steps required.

We are grateful to the authors for their contributions and for revising and extending their original WALCOM 2023 papers. We also thank the reviewers for their valuable and thorough comments and the editorial staff of the Journal of Graph Algorithms and Applications for their support in making this special issue possible.