J Braz Comput Soc (2012) 18:83–84
DOI 10.1007/s13173-012-0068-4

EDITORIAL

Graph theory and algorithms

Fourth Latin-American Workshop on Cliques in Graphs

Celina M.H. de Figueiredo · Jayme L. Szwarcfiter

Published online: 16 March 2012

This special issue of the *Journal of the Brazilian Computer Society* is dedicated to the Fourth Latin-American Workshop on Cliques in Graphs, which was held in Itaipava, Brazil, in November 2010. The proceedings containing extended abstracts were published in *Matemática Contemporânea*, Volume 39. The present issue contains a selection of refereed full papers, among those presented at the Workshop.

Graph theory and algorithms are areas that have become increasingly more important within theoretical computer science and discrete mathematics. Their importance stems both from the numerous challenging beautiful theoretical problems, as well as from the several applications in a great variety of areas, within and outside computer science. The Latin-American Workshop on Cliques in Graphs is focused on structural problems in graph theory and is becoming a traditional event in the area. Previous workshops were held in Brazil (2002), Argentina (2006), and Mexico (2008), while the Fifth Workshop is scheduled to be held in Argentina, later this year.

The present volume contains the following papers.

"Sandwich problems on orientations," by O.D. de Gevigney, S. Klein, V.-H. Nguyen, and Z. Szigeti. The authors consider sandwich problems aiming to obtain graphs satisfying certain conditions on their orientations. In particular, polynomial-time algorithms are described for the problem of deciding the existence of a sandwich graph admitting an orientation whose indegrees are all equal to m, for a given integer m.

"On the classification problem for split graphs," by S.M. Almeida, C.P. Mello, and A. Morgana. This paper is devoted to the problem of edge coloring. The classification problem consists of deciding whether the chromatic index of a graph is Δ or $\Delta + 1$. This is a well-known NP-complete decision problem, open for several graph classes, including split graphs. Among other results, the authors prove that the overfull conjecture holds for this class of graphs.

"The interval count of interval graphs and orders: a short survey," by M.R. Cerioli, F.S. Oliveira, and J.L. Szwarcfiter. The interval count is the least number of interval sizes used in an interval representation of an interval graph. It is already an open question to decide whether an interval graph can be represented using two interval sizes. The paper describes the state of the art of this problem, including complete solutions for some special cases of interval graphs.

"On clique colorings of graphs with few P_4's," by S. Klein and A. Morgana. Cographs form a very well-known class of graphs, defined by the absence of P_4's. Several other classes have been defined by somehow restricting the P_4's of a graph. For such classes, the paper describes solutions for the clique coloring problem. The solutions are obtained by decomposing the graphs, according to their primeval decompositions.

"Determining what sets of graphs can be clique trees of a chordal graph," by M. Gutierrez and P. de Caria. Chordal graphs can be represented by trees, named clique trees, whose vertices represent the maximal cliques of the graphs. The clique tree of a chordal graph is not unique; however, not every tree having the same order as the number of maximal cliques of a graph G is a clique tree of G. The authors solve the problem of deciding the existence of a chordal graph whose set of clique trees is precisely a given collection of trees.

C.M.H. de Figueiredo (✉)
COPPE, UFRJ, Rio de Janeiro, Brazil
e-mail: celina@cos.ufrj.br

J.L. Szwarcfiter
Instituto de Matemática, NCE and COPPE, UFRJ, Rio de Janeiro, Brazil
e-mail: jayme@nce.ufrj.br

"Gene clusters as intersections of powers of paths," by V. Costa, S. Dantas, D. Sankoff, and X. Xu. This paper considers a problem in computational biology, with a graph-theoretical modeling for it. The biological problem is to find, if possible, two genomes whose intersection is exactly a given set of genes. The obtained graph-theoretical problem is to decide, for a given graph G, whether there exist two powers of paths whose intersection contains G as an induced subgraph. This problem is solved for unit interval graphs.

"Branch and bound algorithms for the maximum clique problem under a unified framework," by R. Carmo and A. Zuge. The maximum clique problem is one of the most well-known and studied NP-hard problems, and has many applications. This paper reviews several exact algorithms for the maximum clique problem, based on branch-and-bound, all described in a uniform notation and approach. Implementations are also detailed in the paper.

We acknowledge the financial support to the Workshop, from several agencies and institutions, including FAPERJ, CAPES, CNPq, and PESC-COPPE.

We are grateful to the *Journal of the Brazilian Computer Society* for opening to the Workshop the main Brazilian journal in computer science. In particular, we thank Maria Cristina Ferreira de Oliveira, the Editor-in-Chief of the journal, who ultimately made this special issue possible.