Traces of the Latin American Conference on Combinatorics, Graphs and Applications

A selection of papers from LACGA 2004, Santiago, Chile

Introduction

Guillermo Durán [a], Thomas M. Liebling [b] and Martín Matamala [a]

[a] *Universidad de Chile, Santiago, Chile*

[b] *EPFL, Lausanne, Switzerland*

The present issue comprises papers presented at the Latin American Conference on Combinatorics, Graphs and Applications LACGA, held August 2004 in Santiago, Chile. That conference gathered scientists from Latin America, Europe and the US sharing their interest in modern aspects of discrete applied mathematics, its ramifications and applications. Its venue and size, its subject diversity, and last not least, the particularly pleasant working environment made the meeting into an extremely fertile interaction forum between participants, be they well established researchers or young students. In between stimulating presentations, many informal exchanges took place, novel ideas took shape and new projects and partnerships were started. Many exciting new results e.g. in extremal and polyhedral combinatorics, optimization over graphs and applications were presented. This is well documented by the collection of papers presented in rhis issue and we are grateful to the Editor in Chief of DAM for having agreed to host it in this Journal. We thank all the anonymous referees for their careful, competent and diligent reviewing of the submitted papers. We gratefully acknowledge the support from the Millennium Science Nuclei "Complex Engineering Systems" and "Information and Randomness" in Chile as well as the Departments of Industrial Engineering and Mathematical Engineering, and the Center of Mathematical Modeling of the Universidad de Chile, that also hosted the meeting. Here is a quick overview of the papers, classified into the categories: Graph Theory and Combinatorics, Combinatorial Optimization and Polyhedral Combinatorics, and Applications. Finally we would like to thank Marianne Ruegg for her competent support in preparing this issue.

Graph Theory and Combinatorics

On maximum planar induced subgraphs, by Luerbio Faria, Celina M. Herrera de Figueiredo, Sylvain Gravier, Candido F. X. de Mendonça, and Jorge Stolfi, resolves complexity issues about the problem of finding, for a given graph, the smallest number of vertices whose deletion will result in a planar graph. The

problem itself and the associated approximation problems are NP-hard.
Algorithms for clique-independent sets on subclasses of circular-arc graphs, by Guillermo Durán, Min Chih Lin, Sergio Mera, and Jayme Luiz Szwarcfiter, gives a linear time algorithm to solve the maximum cardinality of a clique-independent set in the special case where the graph is a Helly circular-arc graph. Previous algorithms were in $O(n^3)$.
The sandwich problem for cutsets: clique cutset, k-star cutset, by Rafael B. Texeira, and Celina M. Herrera de Figueiredo, proposes polynomial algorithms for several particular sandwich problems. In such problems two graphs are given and a third, with some particular property and whose edge set lies in-between, is found.
Clique-Critical Graphs: bound on the number of vertices and recognition, by Liliana Alcón, establishes that if graph G has m edges, then any clique-critical graph in the class of graphs whose clique-graph is G has at most $2m$ vertices. She also shows in this paper that recognizing a clique-critical graph is NP-complete.
Some basic properties of multiple Hamiltonian covers, by Hans L. Fetter, introduces the concept of multiple Hamiltonian cover and studies it on cubic 3-connected planar graphs. It also relates this notion to problems in geometry.
A Concentration Bound for the Longest Increasing Subsequence of a Randomly Chosen Involution, by Marcos Kiwi, provides a concentration result for the length of the longest increasing sub-sequence of a randomly and uniformly chosen involution of the integers $\{1, \ldots, s\}$.
NP-completeness results for edge modification problems, by Pablo Burzyn, Flavia Bonomo, and Guillermo Durán, addresses the problem of endowing a graph with some given property by edge modifications. They present NP-completeness results for several classes of graphs such as interval, circular-arc, permutation and circle graphs.

Combinatorial Optimization and Polyhedral Combinatorics
On the Commutativity of antiblocker diagrams under lift-and-project operators, by Mariana Escalante, Graciela L. Nasini, and M.C. Varaldo, provides explicit proofs from the non-commutativity of various antiblocker duality diagrams associated with the stable set polytope of a graph. To do so, they look at a particular case of complements of line graphs of complete graphs.
On a certain class of non-ideal clutters, by Gabriela R. Argiroffo, Silvia M. Bianchi, and Graciela L. Nasini, introduces the class of near-ideal clutters which is analogous to those introduced by Shepherd for near-perfect graphs. They give a similar polyhedral characterization for the former as Shepherd did for the latter. They show in particular that near-ideal blockers of graphs are blockers of near-bipartite graphs.
On the Combinatorial Structure of Chromatic Scheduling Polytopes, by Javier Marenco, and Annegret Wagler, studies the structure of this polytope which arises as solution set of the bandwidth allocation problem in radio access

networks and the like. In particular they study what happens to the polytope for increasing frequency bands.
Some Formulations for the Group Steiner Tree Problem, by Carlos E. Ferreira, and Fernando M. de Oliveira Filho. They are interested in a problem which is a slide generalization of the original Steiner problem in graphs. New facets defining in equalities are presented in this problem.

Applications
On the Characterization of the Domination of a Diameter Constrained Network Reliability Model, by Héctor Cancela, and Louis Petingi, deals with a problem which is important in the context of reliable network design. The problem is that of designing a network whose arcs are subject to failure, such that the probability that the surviving arcs span a graph of given (s, K)-diameter exceeds some value. The (s, K)-diameter is the length of the longest simple path from a node s to any node in the set K.
Reoptimization Gaps versus Model Errors in Online-Dispatching of Service Units for ADAC, by Benjamin Hiller, Sven O. Krumke, and Jörg Rambau, considers the difficult online optimization problem of continuously assigning rescue vehicles to new emergency sites. The algorithms must be particularly fast. They compare the methods implemented for the German Automobile Association with "optimal solutions" found using an oracle.
Online-Optimization of Multi-Elevator Transport Systems with Reoptimization Algorithms based on Set-Partitioning Models, by Philipp Friese, and Jörg Rambau. The authors develop, experiment and compare a control policies for a set of K elevators with unit capacity. This is a idealist version of a situation encountered in a large German inventory system.
Maximizing breaks and bounding solutions to the mirrored traveling tournament problem, by Sebastián Urrutia, and Celso Ribeiro, investigates the relation between two aspects of round robin tournament scheduling problems: breaks and distances and they present new heuristics for approximate solutions of this problem.

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