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Boris I. Goldengorin
Valery A. Kalyagin
Panos M. Pardalos *Editors*

Models, Algorithms, and Technologies for Network Analysis

Proceedings of the Second International Conference on Network Analysis

Springer

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Editors

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The nature of God is a circle
of which the center is everywhere
and the circumference is nowhere.

Empedocles (Greek philosopher,
c. 490–430 BC)

Preface

This volume contains two types of papers either presented on the 2nd International Conference on Network Analysis (which took place on May 7–9, 2012 in Nizhny Novgorod, Russia) or submitted within an open call for papers reflecting the activities of LATNA—Laboratory of Algorithms and Technologies for Networks Analysis at the Higher School of Economics. This conference is sponsored by LATNA. All participants, authors and editors are gratefully acknowledge the financial support by The Russian Federation Government Grant, ag.11.G34.31.0057. Our special thanks going to the LATNA's staff, especially to Dr. Mikhail Batsyn for many efforts in the process of collecting and reviewing the submitted papers including the compilation of this final volume. We are grateful to the members of Program Committee and the external referees for their careful reading and many useful comments essentially improving the quality of this book. The success of this conference was pre-defined by the following distinguished plenary speakers:

1. Ding-Zhu Du (University of Texas at Dallas, USA) Min-Weight Connected Sensor Cover and Max-Lifetime Target Coverage
2. Christodoulos Floudas (Princeton University, USA) Towards Large Scale Deterministic Global Optimization
3. Boris Mirkin (Higher School of Economics, Russia) Representing Activities by Taxonomy Concepts: Clustering and Lifting
4. Mauricio Resende (AT&T, USA) Randomized Algorithms for the Handover Minimization Problem in Wireless Network Design

The plenary lectures are unforgettable from many points of view. They were not only based on the state-of-the art in each topic represented by the corresponding speaker but have shown how to organize an overview lecture in an easy understandable way bringing even undergraduate students to the frontier of science in networks and algorithms. This volume contains many new results in modeling and powerful algorithmic solutions applied to the problems in vehicle routing, single machine scheduling, modern financial markets, cell formation in group technology, comparison of brain activities of left- and right-handers, speeding up algorithms for the maximum clique problem, analysis, and applications of different measures in clustering.

There are three overview papers in this volume: an overview of Kernel Principal Component Analysis including its implementation of the improved nearest neighbor and kernel regression methods in MATLAB, an overview of clique relaxation models and their applications, and an overview of the double partition technique together with research progress on approximations for the minimum sensor cover problem. Also this volume contains a new formulation of the facility layout problem and its applications to different issues in health care as well as graph-based analysis applied to the BRIC countries stock markets.

More than 60 researchers including undergraduate students from universities, institutes, governmental agencies, and industrial companies worldwide attended the conference.

Gainesville, FL, USA — Boris I. Goldengorin
Nizhny Novgorod, Russia — Valery A. Kalyagin
Gainesville, FL, USA — Panos M. Pardalos

Program of the Second International Conference on Network Analysis 2012

Monday, May 7th, 2012

Room 313 HSE, 25/12 Bolshaya Pecherskaya Str.

15:00–15:30 Panos M. Pardalos
Second International Conference on Network Analysis 2012

15:30–16:20 Christodoulos A. Floudas
Towards Large Scale Deterministic Global Optimization

16:20–16:40 Coffee Break

16:40–18:10 Session 1

Ludmila Egorova
Behavioral model of stock exchange

Dmitry Malyshev
On expanding operators for the independent set problem

Dmitry Mokeev
Structural and complexial properties of P3-könig graphs

Victor Zamaraev
A heuristics for the weighted independent set problem

Tuesday, May 8th, 2012

Room 313 HSE, 25/12 Bolshaya Pecherskaya Str.

10:00–10:50 Boris Mirkin
Representing activities by taxonomy concepts: clustering and lifting

10:50–11:10 Coffee Break

11:10–12:30 Session 1

Pando G. Georgiev
Innovative tools for analyzing state transitions and evolution of complex dynamic networks

Alexey Yashunsky
Using online social networks for social geography studies

Alexander Rubchinsky
A new algorithm of network decomposition and its application for stock market analysis

12:30–14:00 Lunch Break

14:00–14:50 Ding-Zhu Du
Min-weight connected sensor cover and max-lifetime target coverage

14:50–15:50 Session 2

Anton Kocheturov
Market graph analysis by means of the p-median problem

Mikhail Batsyn
Applying tolerances to the asymmetric capacitated vehicle routing problem

Evgeny Maslov
Complex approach to solving the maximum clique problem

15:50–16:10 Coffee Break

16:10–17:30 Session 3

Grigory Bautin
Markov chains in modeling of the Russian financial market

Dmitry Gorbunov
Simulation of pedestrian crowds with anticipation using cellular automata approach

Pankaj Kumar
Behavioural dynamics in stock market

Lazarev Evgeny Alexandrovich
Bi-criteria model and algorithms of solving data transmission network optimization problem

Wednesday, May 9th, 2012

Room 313 HSE, 25/12 Bolshaya Pecherskaya Str.

9:30–10:20 Mauricio G. C. Resende
Randomized algorithms for the handover minimization problem in wireless network design

10:20–10:40 Coffee Break

10:40–12:20 Session 1

D.V. Kasatkin
Synaptic cellular automaton for description the sequential dynamics of excitatory neural networks

Pavel Sukhov
Heuristic algorithm for the single machine scheduling problem

Ilya Bychkov
"Patterns" for solving the cell formation problem

Peter Koldanov
Statistical properties of the market graph

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