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Evolutionary Computation in Combinatorial Optimization

9th European Conference, EvoCOP 2009
Tübingen, Germany, April 15-17, 2009
Proceedings



Springer

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Cover illustration: "You Pretty Little Flocker" by Alice Eldridge (www.ecila.org
and www.infotech.monash.edu.au/research/groups/cema/flocker/flocker.html)

Library of Congress Control Number: Applied for

CR Subject Classification (1998): F.1, F.2, G.1.6, G.2.1, J.3

LNCS Sublibrary: SL 1 – Theoretical Computer Science and General Issues

ISSN 0302-9743

ISBN-10 3-642-01008-3 Springer Berlin Heidelberg New York

ISBN-13 978-3-642-01008-8 Springer Berlin Heidelberg New York

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Printed in Germany

Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India
Printed on acid-free paper SPIN: 12651580 06/3180 5 4 3 2 1 0

Preface

Metaheuristics have been shown to be effective for difficult combinatorial optimization problems appearing in a wide variety of industrial, economic, and scientific domains. Prominent examples of metaheuristics are evolutionary algorithms, tabu search, simulated annealing, scatter search, memetic algorithms, variable neighborhood search, iterated local search, greedy randomized adaptive search procedures, ant colony optimization, and estimation of distribution algorithms. Problems solved successfully include scheduling, timetabling, network design, transportation and distribution, vehicle routing, the travelling salesman problem, packing and cutting, satisfiability, and general mixed integer programming.

EvoCOP began in 2001 and has been held annually since then. It is the first event specifically dedicated to the application of evolutionary computation and related methods to combinatorial optimization problems. Originally held as a workshop, EvoCOP became a conference in 2004. The events gave researchers an excellent opportunity to present their latest research and to discuss current developments and applications. Following the general trend of hybrid metaheuristics and diminishing boundaries between the different classes of metaheuristics, EvoCOP has broadened its scope in recent years and invited submissions on any kind of metaheuristic for combinatorial optimization.

This volume contains the proceedings of EvoCOP 2009, the 9th European Conference on Evolutionary Computation in Combinatorial Optimization. It was held in Eberhard Karls Universität Tübingen, Germany, April 15-17, 2009, jointly with EuroGP 2009, the 12th European Conference on Genetic Programming, EvoBIO 2009, the 7th European Conference on Evolutionary Computation, Machine Learning and Data Mining in Bioinformatics, and EvoWorkshops 2009, which consisted of the following 12 individual workshops: 6th European Workshop on the Application of Nature-Inspired Techniques for Telecommunication Networks and Other Parallel and Distributed Systems; First European Workshop on Nature-Inspired Methods for Environmental Issues; Third European Workshop on Evolutionary Computation in Finance and Economics; First European Workshop on Bio-inspired Algorithms in Games; 5th European Workshop on Bio-Inspired Heuristics for Design Automation, 11th European Workshop on Evolutionary Computation in Image Analysis and Signal Processing; Third European Workshop on Interactive Evolution and Humanized Computational Intelligence; 7th European Workshop on Evolutionary and Biologically Inspired Music, Sound, Art and Design; Second European Workshop on Bio-inspired Algorithms for Continuous Parameter Optimization; 4th European Graduate Student Workshop on Evolutionary Computation; 6th European Workshop on Evolutionary Algorithms in Stochastic and Dynamic Environments; and Third European Workshop on Evolutionary Computation in Transportation and Logistics. Since 2007, all these events have been grouped

under the collective name EvoStar, and constitute Europe's premier co-located meetings on evolutionary computation.

Accepted papers of previous EvoCOP editions were published by Springer in the series *Lecture Notes in Computer Science* (LNCS – Volumes 2037, 2279, 2611, 3004, 3448, 3906, 4446, 4972).

EvoCOP	Submitted	Accepted	Acceptance Rate
2001	31	23	74.2%
2002	32	18	56.3%
2003	39	19	48.7%
2004	86	23	26.7%
2005	66	24	36.4%
2006	77	24	31.2%
2007	81	21	25.9%
2008	69	24	34.8%
2009	53	21	39.6%

The rigorous, double-blind reviewing process of EvoCOP 2009 resulted in a strong selection among the submitted papers; the acceptance rate was 39.6%. Each paper was reviewed by at least three members of the international Program Committee. All accepted papers were presented orally at the conference and are included in this proceedings volume. We would like to acknowledge the members of our Program Committee, to whom we are very grateful for their thorough work. EvoCOP 2009 contributions consist of new algorithms together with important new insights into how well these algorithms can solve prominent test problems from the literature or real-world problems.

We would like to express our sincere gratitude to the two internationally renowned invited speakers, who gave the keynote talks at the conference: Stuart Hameroff, Professor Emeritus Departments of Anesthesiology and Psychology and Director, Center for Consciousness Studies, The University of Arizona, USA, and Peter Schuster, Institute of Theoretical Chemistry at Universität Wien and President of the Austrian Academy of Sciences.

The success of the conference resulted from the input of many people to whom we would like to express our appreciation. The local organizers, led by Marc Ebner, from Wilhelm Schickard Institute for Computer Science at Universität Tübingen, have done an extraordinary job for which we are very grateful. Also grateful thanks for local support from Andreas Zell, Chair of Computer Architecture at the Wilhelm Schickard Institute for Computer Science, Universität Tübingen, and Peter Weit, Vice Director of the Seminar for Rhetorics at the New Philology Department, Universität Tübingen. Thanks also to Tübingen Info Office (especially Marco Schubert) for local tourism and information, and to the German Research Foundation (DFG) for financial support for the EvoStar conference.

We thank Marc Schoenauer from INRIA in France for continued assistance in providing the MyReview conference management system. Thanks are also due to

Jennifer Willies and the Centre for Emergent Computing at Edinburgh Napier University, UK for administrative support and event coordination. Last, but not least, we would like to thank Jens Gottlieb, Jano van Hemert, and Günther Raidl for their hard work and dedication in past editions of EvoCOP, which contributed to making this conference one of the reference events in evolutionary computation and metaheuristics.

April 2009

Carlos Cotta
Peter Cowling

Organization

EvoCOP 2009 was organized jointly with EuroGP 2009, EvoBIO 2009, and EvoWorkshops 2009.

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