

Commenced Publication in 1973

Founding and Former Series Editors:

Gerhard Goos, Juris Hartmanis, and Jan van Leeuwen

Editorial Board

David Hutchison

Lancaster University, UK

Takeo Kanade

Carnegie Mellon University, Pittsburgh, PA, USA

Josef Kittler

University of Surrey, Guildford, UK

Jon M. Kleinberg

Cornell University, Ithaca, NY, USA

Alfred Kobsa

University of California, Irvine, CA, USA

Friedemann Mattern

ETH Zurich, Switzerland

John C. Mitchell

Stanford University, CA, USA

Moni Naor

Weizmann Institute of Science, Rehovot, Israel

Oscar Nierstrasz

University of Bern, Switzerland

C. Pandu Rangan

Indian Institute of Technology, Madras, India

Bernhard Steffen

University of Dortmund, Germany

Madhu Sudan

Massachusetts Institute of Technology, MA, USA

Demetri Terzopoulos

University of California, Los Angeles, CA, USA

Doug Tygar

University of California, Berkeley, CA, USA

Gerhard Weikum

Max-Planck Institute of Computer Science, Saarbruecken, Germany

María J. Blesa Christian Blum
Carlos Cotta Antonio J. Fernández
José E. Gallardo Andrea Roli
Michael Sampels (Eds.)

Hybrid Metaheuristics

5th International Workshop, HM 2008
Málaga, Spain, October 8-9, 2008
Proceedings

Volume Editors

María J. Blesa
Universitat Politècnica de Catalunya, Barcelona, Spain
E-mail: mjblesa@lsi.upc.edu

Christian Blum
Universitat Politècnica de Catalunya, Barcelona, Spain
E-mail: cblum@lsi.upc.edu

Carlos Cotta
Universidad de Málaga, Málaga, Spain
E-mail: ccottap@lcc.uma.es

Antonio J. Fernández
Universidad de Málaga, Málaga, Spain
E-mail: afdez@lcc.uma.es

José E. Gallardo
Universidad de Málaga, Málaga, Spain
E-mail: pepeg@lcc.uma.es

Andrea Roli
DEIS, Università di Bologna, Cesena, Italy
E-mail: andrea.roli@unibo.it

Michael Sampels
Université Libre de Bruxelles, Bruxelles, Belgium
E-mail: msampels@ulb.ac.be

Library of Congress Control Number: 2008936281

CR Subject Classification (1998): I.2.8, F.2, G.1.6, F.1, G.2

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

ISSN	0302-9743
ISBN-10	3-540-88438-6 Springer Berlin Heidelberg New York
ISBN-13	978-3-540-88438-5 Springer Berlin Heidelberg New York

This work is subject to copyright. All rights are reserved, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, re-use of illustrations, recitation, broadcasting, reproduction on microfilms or in any other way, and storage in data banks. Duplication of this publication or parts thereof is permitted only under the provisions of the German Copyright Law of September 9, 1965, in its current version, and permission for use must always be obtained from Springer. Violations are liable to prosecution under the German Copyright Law.

Springer is a part of Springer Science+Business Media
springer.com

© Springer-Verlag Berlin Heidelberg 2008
Printed in Germany

Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India
Printed on acid-free paper SPIN: 12533855 06/3180 5 4 3 2 1 0

Preface

“You see, I have a lot of special knowledge which I apply to the problem, and which facilitates matters wonderfully,” says Sherlock Holmes to Dr. Watson in *A Study in Scarlet* by Arthur Conan Doyle. The *knowledge* exploited to tackle difficult problems is probably the main theme of the papers selected for this fifth edition of the International Workshop on Hybrid Metaheuristics. Indeed, in most of the papers a specific combination of metaheuristics and other solving techniques is presented for tackling a particular relevant constrained optimization problem, such as fiber optic networks, timetabling and freight train scheduling problems. The quest for solvers which can successfully and efficiently handle *relevant problems* is the main motivation for research in metaheuristics: it is important to keep this in mind so as to clearly state our research goals and methodology. The question arises as to what is the definition of *relevant problems* and a possible answer is that any useful and even just interesting or funny problem can be considered as scientifically relevant.

The research goal of solving relevant problems does not require practitioners to assemble some software code and, with a little faith in alchemy, hope that the outcome is a reasonably good solution. On the contrary, this research must be grounded on a scientific method and on technological skills. That is why it is so important to support the assessment of an algorithm’s performance with a sound methodology. This requires studying theoretical models for describing properties of the hybrid metaheuristics, and to be open to other communities and to compare our achievements with theirs.

We would like this to be the view of the participants of the International Workshop on Hybrid Metaheuristics combined with tangible improvements in producing scientifically grounded results. The selection of papers should be useful to researchers both in finding new ideas and for implementing efficient solutions.

As in previous editions of this workshop, special care was taken in the reviewing process: out of 33 submissions received, 14 papers were selected on the basis of the reviews by the Program Committee members and evaluations by the Program Chairs. The review process was systematic and intended for providing authors with constructive suggestions for improvements. Our special thanks go to the Program Committee members for their devoted efforts.

An agenda for future research in hybrid metaheuristics could focus on three objectives: (a) the field should become more rigorous, (b) results need to be compared with those produced by other techniques, (c) new application areas should be explored. Rigour is important to earn the acceptance of our colleagues in related communities. The comparison with related fields is valuable in assessing the effectiveness of hybrid techniques and in developing improved hybrid algorithms. New application areas can provide us with exciting new problems

that have both stochastic and online elements, which arise both in simulation and data mining. In other words, “*a lot of special knowledge ... which facilitates matters wonderfully.*”

August 2008

María J. Blesa
Christian Blum
Carlos Cotta
Antonio J. Fernández
José E. Gallardo
Andrea Roli
Michael Sampels

Organization

General Chair

Carlos Cotta Universidad de Málaga, Spain

Program Chairs

María J. Blesa	Universitat Politècnica de Catalunya, Barcelona, Spain
Christian Blum	Universitat Politècnica de Catalunya, Barcelona, Spain
Antonio J. Fernández	Universidad de Málaga, Spain
José E. Gallardo	Universidad de Málaga, Spain
Andrea Roli	Università di Bologna, Italy
Michael Sampels	Université Libre de Bruxelles, Belgium

Program Committee

Chris Beck	University of Toronto, Canada
Mauro Birattari	Université Libre de Bruxelles, Belgium
Jürgen Branke	Universität Karlsruhe, Germany
Marco Chiarandini	Syddansk Universitet, Denmark
Luca Di Gaspero	Università di Udine, Italy
Marco Dorigo	Université Libre de Bruxelles, Belgium
Karl Dörner	Technische Universität Wien, Austria
Michael Emmerich	Universiteit Leiden, The Netherlands
Antonio J. Fernández	Universidad de Málaga, Spain
José E. Gallardo	Universidad de Málaga, Spain
William Havens	Simon Fraser University, Canada
Thomas Jansen	Technische Universität Dortmund, Germany
Joshua Knowles	University of Manchester, UK
Andrea Lodi	Università di Bologna, Italy
Daniel Merkle	Syddansk Universitet, Denmark
Bernd Meyer	Monash University, Australia
Martin Middendorf	Universität Leipzig, Germany
J. Marcos Moreno	Universidad de La Laguna, Spain
José A. Moreno	Universidad de La Laguna, Spain
Boris Naujoks	Technische Universität Dortmund, Germany
David Pelta	Universidad de Granada, Spain
Steven Prestwich	4C, Cork, Ireland
Christian Prins	Université de Technologie de Troyes, France

VIII Organization

Günther Raidl	Technische Universität Wien, Austria
Günter Rudolph	Technische Universität Dortmund, Germany
Andrea Schaerf	Università di Udine, Italy
Marc Sevaux	Université Européenne de Bretagne, France
Thomas Stützle	Université Libre de Bruxelles, Belgium

Additional Referees

Valentina Cacchiani, Maria Kandyba, Marco Lübbecke

Table of Contents

An Evolutionary ILS-Perturbation Technique	1
<i>Manuel Lozano and C. García-Martínez</i>	
A Cultural Algorithm for POMDPs from Stochastic Inventory Control	16
<i>S.D. Prestwich, S.A. Tarim, R. Rossi, and B. Hnich</i>	
A Variable Neighborhood Search Integrated in the POPMUSIC Framework for Solving Large Scale Vehicle Routing Problems	29
<i>Alexander Ostertag, Karl F. Doerner, and Richard F. Hartl</i>	
A Memetic Algorithm with Population Management (MA PM) for the Periodic Location-Routing Problem	43
<i>Caroline Prodhon and Christian Prins</i>	
Memetic Algorithm for Intense Local Search Methods Using Local Search Chains	58
<i>Daniel Molina, Manuel Lozano, C. García-Martínez, and Francisco Herrera</i>	
Incremental Particle Swarm-Guided Local Search for Continuous Optimization	72
<i>Marco A. Montes de Oca, Ken Van den Eenden, and Thomas Stützle</i>	
Optimised Search Heuristic Combining Valid Inequalities and Tabu Search	87
<i>Susana Fernandes and Helena R. Lourenço</i>	
Iterated Greedy Algorithms for a Real-World Cyclic Train Scheduling Problem	102
<i>Zhi Yuan, Armin Fügenschuh, Henning Homfeld, Prasanna Balaprakash, Thomas Stützle, and Michael Schoch</i>	
On the Integration of a TSP Heuristic into an EA for the Bi-objective Ring Star Problem	117
<i>Arnaud Liefoghe, Laetitia Jourdan, Nicolas Jozefowicz, and El-Ghazali Talbi</i>	
Boosting VNS with Neighborhood Heuristics for Solving Constraint Optimization Problems	131
<i>Nicolas Levasseur, Patrice Boizumault, and Samir Loudni</i>	
Hybrid Local Search Techniques for the Generalized Balanced Academic Curriculum Problem	146
<i>Luca Di Gaspero and Andrea Schaerf</i>	

Lagrangian Decomposition, Metaheuristics, and Hybrid Approaches for the Design of the Last Mile in Fiber Optic Networks	158
<i>Markus Leitner and Günther R. Raidl</i>	
Combining Forces to Reconstruct Strip Shredded Text Documents	175
<i>Matthias Prandtstetter and Günther R. Raidl</i>	
A Memetic Algorithm for the Tool Switching Problem	190
<i>Jhon Edgar Amaya, Carlos Cotta, and Antonio J. Fernández</i>	
Author Index	203