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EvoMUSART, EvoNUM, EvoSTOC, and EvoTransLog
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Volume Editors

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Preface

Evolutionary computation (EC) techniques are efficient, nature-inspired planning and optimization methods based on the principles of natural evolution and genetics. Due to their efficiency and simple underlying principles, these methods can be used in the context of problem solving, optimization, and machine learning. A large and continuously increasing number of researchers and professionals make use of EC techniques in various application domains. This volume presents a careful selection of relevant EC examples combined with a thorough examination of the techniques used in EC. The papers in the volume illustrate the current state of the art in the application of EC and should help and inspire researchers and professionals to develop efficient EC methods for design and problem solving.

All papers in this book were presented during EvoWorkshops 2008, which consisted of a range of workshops on application-oriented aspects of EC. Since 1998, EvoWorkshops has provided a unique opportunity for EC researchers to meet and discuss application aspects of EC and has served as an important link between EC research and its application in a variety of domains. During these ten years new workshops have arisen, some have disappeared, while others have matured to become conferences of their own, such as EuroGP in 2000, EvoCOP in 2004, and EvoBIO last year.

EvoWorkshops are part of EVO*, Europe's premier co-located event in the field of evolutionary computing. EVO* 2008 was held in Naples, Italy, on 26-28 March 2008, and included, in addition to EvoWorkshops, EuroGP, the main European event dedicated to genetic programming; EvoCOP, the main European conference on EC in combinatorial optimization; and EvoBIO, the main European conference on EC and related techniques in bioinformatics and computational biology. The proceedings of all of these events, EuroGP 2008, EvoCOP 2008 and EvoBIO 2008, are also available in the LNCS series (volumes 4971, 4972, and 4973).

The central aim of the EVO* events is to provide researchers, as well as people from industry, students, and interested newcomers, with an opportunity to present new results, discuss current developments and applications, or just become acquainted with the world of EC. Moreover, it encourages and reinforces possible synergies and interactions between members of all scientific communities that may benefit from EC techniques.

EvoWorkshops 2008 consisted of the following individual workshops:

- *EvoCOMNET*, the Fifth European Workshop on the Application of Nature-Inspired Techniques to Telecommunication Networks and Other Connected Systems,
- *EvoFIN*, the Second European Workshop on Evolutionary Computation in Finance and Economics,

- *EvoHOT*, the Fourth European Workshop on Bio-inspired Heuristics for Design Automation,
- *EvoIASP*, the Tenth European Workshop on Evolutionary Computation in Image Analysis and Signal Processing,
- *EvoMUSART*, the Sixth European Workshop on Evolutionary and Biologically Inspired Music, Sound, Art and Design,
- *EvoNUM*, the First European Workshop on Bio-inspired Algorithms for Continuous Parameter Optimization,
- *EvoSTOC*, the Fifth European Workshop on Evolutionary Algorithms in Stochastic and Dynamic Environments, and
- *EvoTRANSLOG*, the Second European Workshop on Evolutionary Computation in Transportation and Logistics.

EvoCOMNET addresses the application of EC techniques to problems in distributed and connected systems such as telecommunication and computer networks, distribution and logistic networks, interpersonal and interorganizational networks, etc. To address these challenges, this workshop promotes the study and the application of strategies inspired by the observation of biological and evolutionary processes, that usually show the highly desirable characteristics of being distributed, adaptive, scalable, and robust.

EvoFIN is the first European event specifically dedicated to the applications of EC, and related natural computing methodologies, to finance and economics. Financial environments are typically hard, being dynamic, high-dimensional, noisy and co-evolutionary. These environments serve as an interesting test bed for novel evolutionary methodologies.

EvoHOT focuses on innovative heuristics and bio-inspired techniques applied to the electronic design automation. It shows the latest developments, the reports of industrial experiences, the successful attempts to *evolve* rather than *design* new solutions, and the hybridizations of traditional methodologies.

EvoIASP, the longest-running of all EvoWorkshops, which celebrates its tenth edition this year, since 1999 constituted the first international event solely dedicated to the applications of EC to image analysis and signal processing in complex domains of high industrial and social relevance.

EvoMUSART addresses all practitioners interested in the use of EC techniques for the development of creative systems. There is a growing interest in the application of these techniques in fields such as art, music, architecture and design. The goal of this workshop is to bring together researchers that use EC in this context, providing an opportunity to promote, present and discuss the latest work in the area, fostering its further developments and collaboration among researchers.

EvoNUM aims at applications of bio-inspired algorithms, and cross-fertilization between these and more classical numerical optimization algorithms, to continuous optimization problems in engineering. It deals with engineering applications where continuous parameters or functions have to be optimized, in fields such

as control, chemistry, agriculture, electricity, building and construction, energy, aerospace engineering, design optimization.

EvoSTOC addresses the application of EC in stochastic and dynamic environments. This includes optimization problems with changing, noisy, and/or approximated fitness functions and optimization problems that require robust solutions. These topics recently gained increasing attention in the EC community, and EvoSTOC was the first workshop that provided a platform to present and discuss the latest research in this field.

EvoTRANSLOG deals with all aspects of the use of evolutionary computation, local search and other nature-inspired optimization and design techniques for the transportation and logistics domain. The impact of these problems on the modern economy and society has been growing steadily over the last few decades, and the workshop aims at design and optimization techniques such as evolutionary computing approaches allowing us to use computer systems for systematic design, optimization, and improvement of systems in the transportation and logistics domain.

Along the line of adapting the list of the events to the needs and demands of the researchers working in the field of evolutionary computing, EvoINTERACTION, the European Workshop on Interactive Evolution and Humanized Computational Intelligence, did not take place in 2008, but it will be run again next year. Similarly, EvoHOT was held this year, while it was not held during EVO* 2007. A new workshop was also proposed this year, EvoTHEORY, the first European Workshop on Theoretical Aspects in Artificial Evolution. Due to the limited number of submissions, the workshop's chairs, Jonathan E. Rowe and Mario Giacobini, decided not to hold the event in 2008. However, two high-quality articles that were submitted there were presented during the EVO* days and are included in this volume.

The number of submissions to EvoWorkshops 2008 was once again very high, cumulating in 133 entries (with respect to 149 in 2006 and 160 in 2007). The following table shows relevant statistics for EvoWorkshops 2008 (both short and long papers are considered in the acceptance statistics), where the statistics for the 2007 edition are also reported, except for EvoHOT whose last edition was in 2006:

year	2008			previous edition		
	submissions	accepted	ratio	submissions	accepted	ratio
EvoCOMNET	10	6	60%	44	18	40.9%
EvoFIN	15	8	53.3%	13	8	61.5%
EvoHOT	15	9	60%	9	5	55.6%
EvoIASP	26	16	61.5%	35	21	60%
EvoMUSART	31	17	54.8%	30	15	50%
EvoNUM	14	8	57.1%	-	-	-
EvoSTOC	8	4	50%	11	5	45.5%
EvoTHEORY	3	2	66.6%	-	-	-
EvoTRANSLOG	11	5	45.4%	20	8	40%
Total	133	75	56.4%	160	79	49.4%

Full papers, covering 10 pages, and short papers, covering 6 pages, were accepted for the event. The two classes of papers were either presented orally over the three conference days, or presented and discussed during a special poster session. The low acceptance rate of 56.4% for EvoWorkshops 2008 along with the significant number of submissions, is an indicator of the high quality of the articles presented at the workshops, showing the liveliness of the scientific movement in the corresponding fields.

Many people helped make EvoWorkshops 2008 a success. We would like to thank the following institutions:

- the Instituto Tecnológico de Informática in València, Spain, for hosting the EVO* website,
- Naples City Council, Italy, for supporting the local organization and their patronage of the event,
- the Centre for Emergent Computing at Napier University in Edinburgh, Scotland, for administrative help and event coordination.

We would particularly like to acknowledge the invaluable support of Professor Guido Trombetti, Rector of the University of Naples Federico II, and Professor Giuseppe Trautteur of the Department of Physical Sciences.

Even with excellent support and a perfect location, an event like EVO* would not be feasible without authors submitting their work, members of the program committees dedicating their time and energy to review the papers, and an audience. All these people deserve our gratitude.

Finally, we are grateful to all those involved in the preparation of the event, especially Jennifer Willies for her unfaltering dedication to the coordination of the event over the years. Without her support, running an event like this, with such a large number of different organizers and different opinions, would be impossible. Further thanks to the local organizers Ivanoe De Falco, Antonio Della Cioppa, and Ernesto Tarantino for making the organization of such an event possible in a place as unique as Naples. Last but surely not least, we want to specially thank Anna I. Esparcia-Alcázar, for her hard work as publicity chair of the event, and Marc Schoenauer for his continuous help in setting up and maintaining the MyReview management software.

March 2008

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Organization

EvoWorkshops 2008 was part of EVO* 2008, Europe's premier co-located event in the field of evolutionary computing, that included also the conferences EuroGP 2008, EvoCOP 2008, and EvoBIO 2008.

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