

Samira El Yacoubi
Bastien Chopard
Stefania Bandini (Eds.)

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Cellular Automata

7th International Conference on Cellular Automata
for Research and Industry, ACRI 2006
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Samira El Yacoubi
Laboratoire de Théorie des Systèmes (LTS) - MEPS
Université de Perpignan
France
E-mail: yacoubi@univ-perp.fr

Bastien Chopard
Centre Universitaire d'Informatique (CU)
Université de Genève
Switzerland
E-mail: Bastien.Chopard@cui.unige.ch

Stefania Bandini
Dipartimento di Informatica, Sistemistica e Comunicazione
Università degli Studi di Milano-Bicocca
20126 Milano
Italy
E-mail: bandini@disco.unimib.it

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Preface

This volume constitutes the proceedings of the International Conference on Cellular Automata for Research and Industry, ACRI 2006, which took place in Perpignan, France, September 20–23, 2006. The conference, which was organized by the laboratory of Mathematics and Physics for Systems (MEPS), University of Perpignan, France, was the seventh in a series of conferences inaugurated in 1994 in Rende, Italy: ACRI 1996 in Milan, Italy, ACRI 1998 in Trieste, Italy, ACRI 2000 in Karlsruhe, Germany, ACRI 2002 in Geneva, Switzerland and ACRI 2004 in Amsterdam, The Netherlands.

The ACRI conference is traditionally focussed on challenging problems and new research in theoretical aspects including cellular automata tools and computational sciences. It is also concerned with applications and the solution of problems from the fields of physics, engineering and life sciences. Its primary goal is to discuss problems from various areas, to identify new issues and to enlarge the research field of CA. Since its inception, the ACRI conference has attracted an ever growing community and has raised knowledge and interest in the study of cellular automata for both new entrants into the field as well as researchers already working on particular aspects of cellular automata.

First invented by von Neumann, cellular automata models have been popularized and investigated in several areas during the last decades. They provide a mathematically rigorous framework for a class of discrete dynamical systems that allow complex, unpredictable behavior to emerge from the deterministic local interactions of many simple components acting in parallel.

ACRI 2006 brought together over 100 distinguished mathematicians, computer scientists and other researchers working in the field of CA theory and applications. A special interest was devoted to the general concepts, theories, methods and techniques associated with modelling, analysis and implementation in various systems (e.g., biological, physical, ecological, social). Cellular Automata are classically run on a regular lattice and with perfect synchronicity and homogeneity. ACRI 2006 encouraged recent trends which consider asynchronous, inhomogeneous and non-autonomous cellular automata with unstructured environments. In order to highlight the multidisciplinary of the cellular automata research area, the First International Workshop on Crowds and Cellular Automata was organized within the scope of ACRI 2006 at the University of Perpignan, 19–20 September.

The volume contains 72 refereed papers addressing various important topics in cellular automata, covering theoretical results and highlighting potential applications. A total of 53 papers were presented as oral talks and 19 as posters during the conference by speakers coming from about 15 different countries. These papers were selected among 100 submitted contributions. Each paper was reviewed by at least two members of the scientific committee. We are extremely

grateful to these referees, who accepted the difficult task of selecting papers. Their expertise and efficiency ensured the high quality of the conference. The volume also contains 11 extended abstracts dealing with crowds and cellular automata, which were presented during the C&CA workshop.

Five invited speakers of worldwide reputation presented the latest trends in the field in the context of standard cellular automata and beyond. We would like to take this opportunity to express our sincere thanks to Raffaello D'Andrea from Cornell University, Paolo De Los Rios from the Ecole Polytechnique Fédérale de Lausanne, Sergey Gavrillets from the University of Tennessee, Moshe Sipper from Ben-Gurion University, and Marco Tomassini from the Université de Lausanne, who kindly accepted our invitation to give plenary lectures at ACRI 2006. Moreover, we were very honored that Andrew Wuensche from the University of Sussex accepted to give a demo of Discrete Dynamics Lab and show his very recent work on 2D hexagonal cellular automata with computational abilities.

This volume is divided into two parts. The first part deals with theoretical aspects and computational analysis of CA and the second one with applications derived from physical, biological, environmental and other systems. Each part is partitioned into chapters containing a number of papers in alphabetical order.

It should be stressed that this conference would have been impossible without the help and continuous encouragement of a number of people, especially the members of steering committee, who strongly supported the organization of ACRI 2006 in Perpignan. First of all, we would like to thank the authors, who showed their interest in ACRI 2006 by submitting their papers for consideration. We wish to extend our gratitude to Stefania Bandini and Andrew Adamatzky, the organizers of the first workshop "Crowds and Cellular Automata" (C&CA), who helped to introduce the ACRI conference to other scientific communities.

It is a pleasure to express our sincere thanks to our colleagues of the Organizing Committee and to Paolo Mereghetti for the successful job he carried out in editing this volume. A special word of thanks goes to Yves Maurissen for the huge amount of work he did during the organization of this conference and the practical assistance he provided to the participants.

Finally, the organization of ACRI 2006 was made possible thanks to the financial or technical support of the board and several departments of the University of Perpignan (Centre de Ressources Informatiques – CRI, Service de la Communication, etc), the Scientific and Parallel Computing Group from the University of Geneva (Switzerland), the commune of Perpignan, the Academia of Science (Morocco) and other institutions and local authorities.

September 2006

Samira El Yacoubi
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